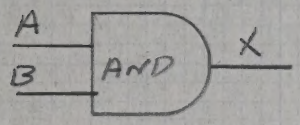
Oxford

STOCK No. 152⅓

MADE IN U. S. A.



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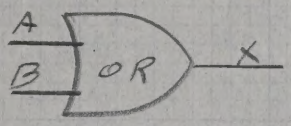
1	0	0
0	1	0
1	1	1

ALL 1 = 1

ANY 0 = 0



ALL 0 = 0. ANY 1 = 1

A	B	X
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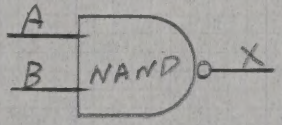
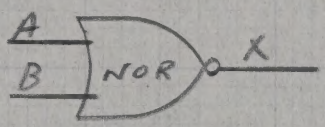
1	0	1
0	1	1
1	1	1



ALL 1 = 0 ANY 0 = 1

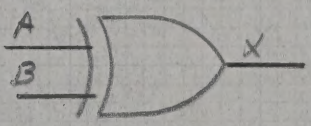
A	B	X
0	0	1
1	0	1
0	1	1
1	1	0



ALL 0 = 1 ANY 1 = 0

A	B	X
0	0	1
1	0	0
0	1	0
1	1	0

EXCLUSIVE OR



BOTH 1 OR 0 = 0

DIFFERENT INPUTS = 1

A	B	X
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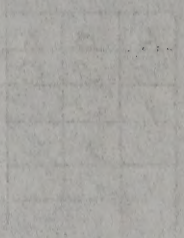
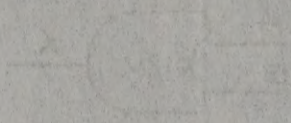
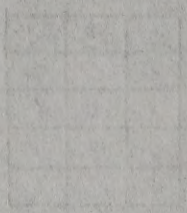
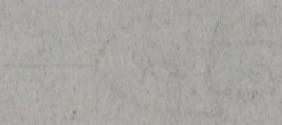
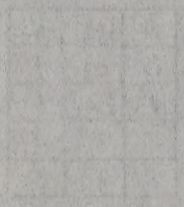
1	0	1
0	1	1
1	1	0

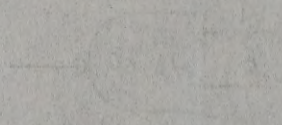


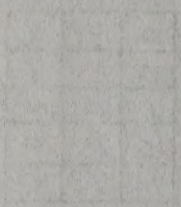


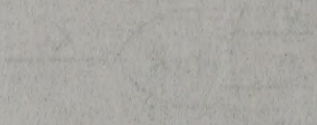


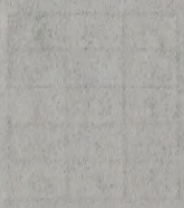


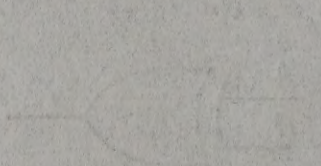












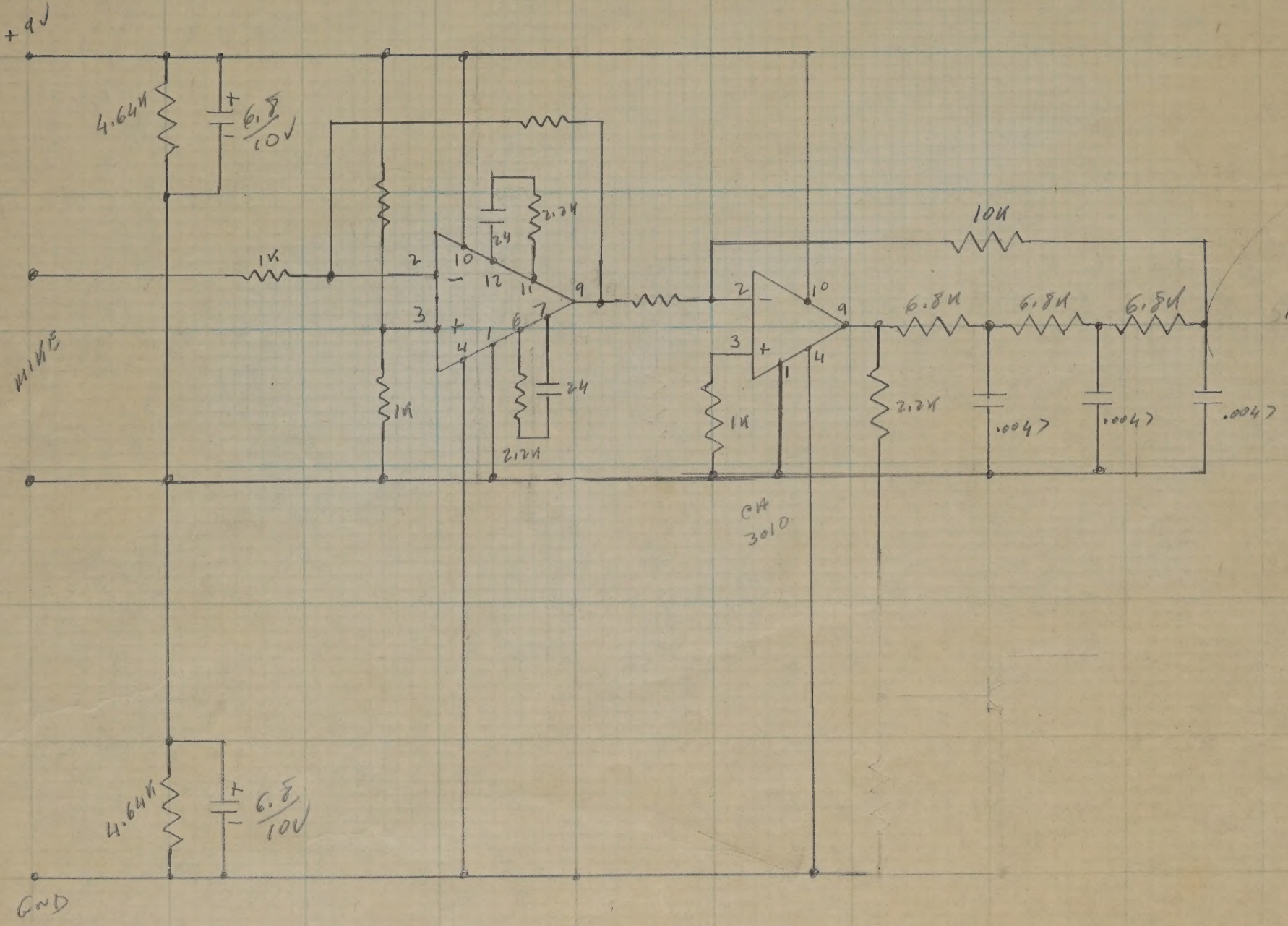
METRIC

some Universal Numbers

MM	Frac.	Inches	MM	Frac.	Inches	MM	Frac.	Inches	MM	Frac.	Inches
.01		.0004	8.3344	21/64	.3281	21.4312	27/32	.8437	57		2.244
.02		.0008	8.7312	11/32	.3437	21.8281	55/64	.8594	58		2.283
.03		.0012	**9.000**		.3543	**22.000**		.8661	59		2.323
.04		.0016	9.1281	23/64	.3594	22.2250	**7/8**	**.875**	**60**		2.362
.05		.0020	9.525	**3/8**	**.375**	22.6219	57/64	.8906	61		2.402
.06		.0024	9.9219	25/64	.3906	**23.000**		.9055	62		2.441
.07		.0028	**10.000**		.3937	23.0187	29/32	.9062	63		2.480
.08		.0032	10.3187	13/32	.4062	23.4156	59/64	.9219	64		2.520
.09		.0035	10.7156	27/64	.4219	23.8125	15/16	.9375	**65**		2.559
.10		.004	**11.000**		.4331	**24.000**		.9449	66		2.598
.20		.008	11.1125	7/16	.4375	24.2094	61/64	.9531	67		2.638
.30		.012	11.5094	29/64	.4531	24.6062	31/32	.9687	68		2.677
.3969	**1/64**	**.0156**	11.9062	15/32	.4687	**25.000**		.9843	69		2.717
.40		.0158	**12.000**		.4724	25.0031	63/64	.9844	**70**		2.756
.50		.0197	12.3031	31/64	.4844	25.400	**1"**	**1.000**	71		2.795
.60		.0236	12.700	**1/2**	**.500**	26		1.024	72		2.835
.70		.0276	**13.000**		.5118	27	1-1/16	1.063	73		2.874
.7937	**1/32**	**.0312**	13.0968	33/64	.5156	28		1.102	74		2.913
.80		.0315	13.4937	17/32	.5312	29		1.142	**75**	2-61/64	2.953
.90		.0354	13.8906	35/64	.5469	**30**		1.181	76		2.992
1.000		.0394	**14.000**		.5512	31		1.220	77	3-1/32	3.031
1.1906	3/64	.0469	14.2875	**9/16**	**.5625**	32		1.260	78		3.071
1.5875	**1/16**	**.0625**	14.6844	37/64	.5781	33		1.299	79		3.110
1.9844	5/64	.0781	**15.000**		.5906	34		1.339	**80**		3.150
2.000		.0787	15.0312	19/32	.5937	**35**		1.378	81		3.189
2.3812	3/32	.0937	15.4781	39/64	.6094	36		1.417	82		3.228
2.7781	7/64	.1094	15.875	**5/8**	**.625**	37		1.457	83		3.268
3.000		.1181	**16.000**		.6299	38		1.496	84		3.307
3.175	**1/8**	**.125**	16.2719	41/64	.6406	39		1.535	**85**		3.346
3.5719	9/64	.1406	16.6687	21/32	.6562	**40**		1.575	86		3.386
3.9687	5/32	.1562	**17.000**		.6693	41		1.614	87		3.425
4.000		.1575	17.0656	43/64	.6719	42		1.654	88		3.465
4.3656	11/64	.1719	17.4625	11/16	.6875	43		1.693	89		3.504
4.7625	**3/16**	**.1875**	17.8594	45/64	.7031	44		1.732	**90**		3.543
5.000		.1969	**18.000**		.7087	**45**		1.772	91		3.583
5.1594	13/64	.2031	18.2562	23/32	.7187	46		1.811	92		3.622
5.5562	7/32	.2187	18.6532	47/64	.7344	47		1.850	93		3.661
5.9531	15/64	.2344	**19.000**		.748	48	1-57/64	1.890	94		3.701
6.000		.2362	19.050	**3/4**	**.750**	49		1.929	**95**		3.740
6.3500	**1/4**	**.250**	19.4469	49/64	.7656	**50**		1.969	96		3.780
6.7469	17/64	.2656	19.8433	25/32	.7812	51		2.008	97		3.819
7.000		.2756	**20.000**		.7874	52		2.047	98		3.858
7.1437	9/32	.2812	20.2402	51/64	.7969	53		2.087	99		3.898
7.5406	19/64	.2969	20.6375	13/16	.8125	54		2.126	**100**	3-15/16	3.937
7.9375	**5/16**	**.3125**	**21.000**		.8268	**55**		2.165			
8.000		.315	21.0344	53/64	.8281	56		2.205			

Universal Components — ***213-783-0220***

FAX: ***213-783-0223***


+9V
4.64K
6.8/10V
1K
2.2K
.24
10K
6.8K
6.8K
6.8K
15-20KC.
MIKE
2.2K
.24
1K
2.2K
1K
2.2K
.004
.004
.004
CA
3010
4.64K
6.8/10V
GND

some Universal Rules

WHEN YOU NEED A RULE . . .

1. MURPHY'S LAW: If anything can go wrong, it will.
2. O'TOOLE'S COMMENTARY ON MURPHY'S LAW: Murphy was an optimist.
3. THE UNSPEAKABLE LAW: As soon as you mention something, if it's good, it goes away, if it's bad, it happens.
4. NONRECIPROCAL LAWS OF EXPECTATIONS: Negative expectations yield negative results. Positive expectations yield negative results.
5. HOWE'S LAW: Every man has a scheme that will not work.
6. ZYMURGY'S FIRST LAW OF EVOLVING SYSTEMS DYNAMICS: Once you open a can of worms, the only way to recan them is to use a larger can.
7. ETORRE'S OBSERVATION: The other line moves faster.
8. SKINNER'S CONSTANT (FLANNAGAN'S FINAGLING FACTOR): That quantity which, when multiplied by, divided by, added to or subtracted from the answer you get, gives you the answer you should have gotten.
9. LAW OF SELECTIVE GRAVITY: An object will fall so as to do the most damage.

   JENNING'S COROLLARY: The chance of the bread falling with the buttered side down is directly proportional to the cost of the carpet.
10. GORDON'S FIRST LAW: If a research project is not worth doing, it is not worth doing well.
11. MAIER'S LAW: If the facts do not conform to the theory, they must be disposed of.
12. HOARE'S LAW OF LARGER PROBLEMS: Inside every large problem is a small problem struggling to get out.
13. BOREN'S FIRST LAW: When in doubt, mumble.
14. THE GOLDEN RULE OF ARTS AND SCIENCES: Whoever has the gold makes the rule.
15. BARTH'S DISTINCTION: There are two types of people: those who divide people into two types, and those who do not.
16. SEGAL'S LAW: A man with one watch knows what time it is. A man with two watches is never sure.
17. NINETY-NINETY RULE OF PROJECT SCHEDULES: The first 90 percent of the project takes 90 percent of the time, and the last 10 percent takes the other 90 percent.
18. FARBER'S FOURTH LAW: Necessity is the mother of strange bedfellows.

Universal Components ***213-783-0220***

FAX: ***213-783-0223***

some Universal Rules

WHEN YOU NEED A RULE . . .

1. MURPHY'S LAW: If anything can go wrong, it will.
2. O'TOOLE'S COMMENTARY ON MURPHY'S LAW: Murphy was an optimist.
3. THE UNSPEAKABLE LAW: As soon as you mention something, if it's good, it goes away, if it's bad, it happens.
4. NONRECIPROCAL LAWS OF EXPECTATIONS: Negative expectations yield negative results. Positive expectations yield negative results.
5. HOWE'S LAW: Every man has a scheme that will not work.
6. ZYMURGY'S FIRST LAW OF EVOLVING SYSTEMS DYNAMICS: Once you open a can of worms, the only way to recan them is to use a larger can.
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18. FARBER'S FOURTH LAW: Necessity is the mother of strange bedfellows.

Universal Components — 213-641-4255

FAX: 213-641-6312

Temperature Conversion Table

Find desired temperature in **bold** type. Column to left will convert to degrees Celsius. Column to right will convert to degrees Fahrenheit.

°C		°F	°C		°F	°C		°F	°C		°F	°C		°F
−40.0	**−40**	−40	2.22	**36**	96.8	24.4	**76**	168.8	82.2	**180**	356	190.6	**375**	707
−34.4	**−30**	−22	2.78	**37**	98.6	25.0	**77**	170.6	85.0	**185**	365	193.4	**380**	716
−28.9	**−20**	− 4	3.33	**38**	100.4	25.6	**78**	172.4	87.8	**190**	374	196.1	**385**	725
−23.3	**−10**	14	3.89	**39**	102.2	26.1	**79**	174.2	90.6	**195**	383	198.9	**390**	734
−17.8	**0**	32	4.44	**40**	104.0	26.7	**80**	176.0	93.3	**200**	392	201.7	**395**	743
−17.2	**1**	33.8	5.00	**41**	105.8	27.2	**81**	177.8	96.1	**205**	401	204.4	**400**	752
−16.7	**2**	35.6	5.56	**42**	107.6	27.8	**82**	179.6	98.9	**210**	410	207.2	**405**	761
−16.1	**3**	37.4	6.11	**43**	109.4	28.3	**83**	181.4	100.0	**212**	413	210.0	**410**	770
−15.6	**4**	39.2	6.67	**44**	111.2	28.9	**84**	183.2	101.7	**215**	419	212.8	**415**	779
−15.0	**5**	41.0	7.22	**45**	113.0	29.4	**85**	185.0	104.4	**220**	428	215.6	**420**	788
−14.4	**6**	42.8	7.78	**46**	114.8	30.0	**86**	186.8	107.2	**225**	437	218.4	**425**	797
−13.9	**7**	44.6	8.33	**47**	116.6	30.6	**87**	188.6	110.0	**230**	446	221.1	**430**	806
−13.3	**8**	46.4	8.89	**48**	118.4	31.1	**88**	190.4	112.8	**235**	455	224.0	**435**	815
−12.8	**9**	48.2	9.44	**49**	120.2	31.7	**89**	192.2	115.6	**240**	464	226.7	**440**	824
−12.2	**10**	50.0	10.0	**50**	122.0	32.2	**90**	194.0	118.3	**245**	473	229.5	**445**	833
−11.7	**11**	51.8	10.6	**51**	123.8	32.8	**91**	195.8	121.1	**250**	482	232.2	**450**	842
−11.1	**12**	53.6	11.1	**52**	125.6	33.3	**92**	197.6	123.9	**255**	491	235.0	**455**	851
−10.6	**13**	55.4	11.7	**53**	127.4	33.9	**93**	199.4	126.7	**260**	500	237.8	**460**	860
−10.0	**14**	57.2	12.2	**54**	129.2	34.4	**94**	201.2	129.4	**265**	509	240.5	**465**	869
− 9.44	**15**	59.0	12.8	**55**	131.0	35.0	**95**	203.0	132.2	**270**	518	243.3	**470**	878
− 8.89	**16**	60.8	13.3	**56**	132.8	35.6	**96**	204.8	135.0	**275**	527	248.9	**480**	896
− 8.33	**17**	62.6	13.9	**57**	134.6	36.1	**97**	206.6	137.8	**280**	536	254.4	**490**	914
− 7.78	**18**	64.4	14.4	**58**	136.4	36.7	**98**	208.4	140.6	**285**	545	260.0	**500**	932
− 7.22	**19**	66.2	15.0	**59**	138.2	37.2	**99**	210.2	143.3	**290**	554	268.6	**510**	950
− 6.67	**20**	68.0	15.6	**60**	140.0	37.8	**100**	212.0	146.1	**295**	563	271.1	**520**	968
− 6.11	**21**	69.8	16.1	**61**	141.8	40.6	**105**	221.0	148.9	**300**	572	276.7	**530**	986
− 5.56	**22**	71.6	16.7	**62**	143.6	43.3	**110**	230	151.7	**305**	581	282.2	**540**	1004
− 5.00	**23**	73.4	17.2	**63**	145.4	46.1	**115**	239	154.4	**310**	590	287.8	**550**	1022
− 4.44	**24**	75.2	17.8	**64**	147.2	48.9	**120**	248	157.2	**315**	599	293.3	**560**	1040
− 3.89	**25**	77.0	18.3	**65**	149.0	51.7	**125**	257	160.0	**320**	608	298.9	**570**	1058
− 3.33	**26**	78.8	18.9	**66**	150.8	54.5	**130**	266	162.8	**325**	617	304.4	**580**	1076
− 2.78	**27**	80.6	19.4	**67**	152.6	57.2	**135**	275	165.6	**330**	626	310.0	**590**	1094
− 2.22	**28**	82.4	20.0	**68**	154.4	60.0	**140**	284	168.3	**335**	635	315.6	**600**	1112
− 1.67	**29**	84.2	20.6	**69**	156.2	62.8	**145**	293	171.1	**340**	644	321.1	**610**	1130
− 1.11	**30**	86.0	21.1	**70**	158.0	65.6	**150**	302	173.9	**345**	653	326.7	**620**	1148
− 0.56	**31**	87.8	21.7	**71**	159.8	68.3	**155**	311	176.7	**350**	662	332.2	**630**	1166
0	**32**	89.6	22.2	**72**	161.6	71.1	**160**	320	179.4	**355**	671	337.8	**640**	1184
0.56	**33**	91.4	22.8	**73**	163.4	73.9	**165**	329	182.2	**360**	680	343.3	**650**	1202
1.11	**34**	93.2	23.3	**74**	165.2	76.7	**170**	338	185.0	**365**	689	371.1	**700**	1292
1.67	**35**	95.0	23.9	**75**	167.0	79.4	**175**	347	187.8	**370**	698			

Resistance Correction Factors

Precautions to be taken when measuring resistances

Wire must be tensioned enough in the holding apparatus so that exactly ten feet is measured.

Electrical contact must be very good. Erratic behavior of the null meter is the most common indication of a poor contact. A poor contact will give a high resistance reading.

Temperature corrections significantly affect accuracy. Care must be taken that a precise thermometer is used, that wire is at room temperature, and that the room temperature is reasonably consistent. If the wire is heated by bridge current, the accuracy of the reading may be reduced considerably.

Copper (conductivity: 100% IACS)

DEG. C	FACTOR	DEG. C	FACTOR
15	.9804	28	1.0315
16	.9842	29	1.0354
17	.9882	30	1.0393
18	.9922	31	1.0433
19	.9961	32	1.0471
20	1.0000	33	1.0511
21	1.0039	34	1.0551
22	1.0079	35	1.0590
23	1.0118	36	1.0630
24	1.0157	37	1.0668
25	1.0197	38	1.0709
26	1.0235	39	1.0747
27	1.0275	40	1.0786

EC Aluminum (conductivity: 61.8% IACS)

DEG. C	FACTOR	DEG. C	FACTOR
15	.9796	28	1.0326
16	.9837	29	1.0367
17	.9878	30	1.0408
18	.9918	31	1.0449
19	.9959	32	1.0490
20	1.0000	33	1.0530
21	1.0041	34	1.0571
22	1.0082	35	1.0612
23	1.0122	36	1.0653
24	1.0163	37	1.0694
25	1.0204	38	1.0730
26	1.0245	39	1.0775
27	1.0286	40	1.0816

To obtain resistance at 20°C, divide resistance at any other temperature by factor given above.

Other Metals and Alloys

To calculate and correct resistance at 20°C for other metals and alloys, find the T.C.R. of the desired material in the chart below and apply the value to the following formula:

Formula: $$R_{20°C} = \frac{R_T}{1 + \alpha (T - 20°C)}$$

where: R_T = Resistance obtained at temperature
T = Temperature registered at time of measurement
α = Temperature coefficient of resistance per °C

METAL/ALLOY	TEMPERATURE COEFFICIENT OF RESISTANCE PER °C			METAL/ALLOY
Pure Nickel (99.0%)	.0048		.00002	MWS-800
Gold (99.98%)	.0039		.00013	MWS-675
Silver (99.99%)	.0041		.0001	MWS-650
Platinum	.00393		.0033	MWS-294R
Molybdenum	.0047		.00004	MWS-294
Tungsten	.0048		.00018	MWS-180
Beryllium Copper (CDA 172)	.0015		.0045	MWS-120
Monel*400	.0001		.0004	MWS-90
Manganin	.000015		.00050	MWS-60
Phosphor Bronze (CDA 510)	.00074		.0013	MWS-30

*Registered trademark International Nickel Co.

Gauge to MM Conversion Table

A.W.G.			WIRE	S.W.G.		
INCH	MM	MM²	NUMBER	INCH	MM	MM²
–	–	–	7/0	.5000	12,7000	126,68
–	–	–	6/0	.4640	11,7850	108,98
–	–	–	5/0	.4320	10,9700	94,51
.4600	11,684	107,21	4/0	.4000	10,1600	81,07
.4096	10,404	85,03	3/0	.3720	9,4487	70,12
.3648	9,266	67,43	2/0	.3480	8,8391	61,36
.3249	8,252	53,48	1/0	.3240	8,2295	53,19
.2893	7,348	42,41	1	.3000	7,6200	45,60
.2576	6,543	33,63	2	.2760	7,0103	38,60
.2294	5,827	26,67	3	.2520	6,4008	32,18
.2043	5,189	21,15	4	.2320	5,8972	27,27
.1819	4,621	16,77	5	.2120	5,3847	22,77
.1620	4,115	13,30	6	.1920	4,8768	18,68
.1443	3,665	10,55	7	.1760	4,4703	15,70
.1285	3,264	8,37	8	.1600	4,0640	12,97
.1144	2,906	6,63	9	.1440	3,6576	10,51
.1019	2,588	5,26	10	.1280	3,2512	8,30
.0907	2,304	4,17	11	.1160	2,9463	6,82
.0808	2,052	3,30	12	.1040	2,6416	5,48
.0720	1,829	2,62	13	.0920	2,3368	4,29
.0641	1,628	2,08	14	.0800	2,0320	3,24
.0571	1,450	1,65	15	.0720	1,8288	2,63
.0508	1,291	1,31	16	.0640	1,6256	2,08
.0453	1,150	1,04	17	.0560	1,4224	1,59
.0403	1,024	0,823	18	.0480	1,2192	1,17
.0359	0,9119	0,653	19	.0400	1,0160	0,811
.0320	0,8128	0,518	20	.0360	0,9143	0,657
.0285	0,7239	0,411	21	.0320	0,8128	0,519
.0253	0,6426	0,324	22	.0280	0,7112	0,397
.0226	0,5740	0,258	23	.0240	0,6096	0,292
.0201	0,5106	0,205	24	.0220	0,5588	0,245
.0179	0,4547	0,162	25	.0200	0,5080	0,203
.0159	0,4038	0,129	26	.0180	0,4572	0,164
.0142	0,3606	0,101	27	.0164	0,4166	0,136
.0126	0,3200	0,0810	28	.0148	0,3759	0,111
.0113	0,2870	0,0644	29	.0136	0,3454	0,0937
.0100	0,2540	0,0507	30	.0124	0,3150	0,0779
.0089	0,2261	0,0403	31	.0116	0,2946	0,0682
.0080	0,2032	0,0320	32	.0108	0,2743	0,0591
.0071	0,1803	0,0254	33	.0100	0,2540	0,0507
.0063	0,1601	0,0201	34	.0092	0,2337	0,0429
.0056	0,1422	0,0160	35	.0084	0,2134	0,0358
.0050	0,1270	0,0127	36	.0076	0,1930	0,0293
.0045	0,1143	0,0100	37	.0068	0,1727	0,0234
.0040	0,1016	0,0081	38	.0060	0,1524	0,0182
.0035	0,0889	0,00618	39	.0052	0,1321	0,0137
.0031	0,0787	0,00486	40	.0048	0,1220	0,0117
.0028	0,0711	0,00397	41	.0044	0,1118	0,00981
.0025	0,0635	0,00317	42	.0040	0,1016	0,00811
.0022	0,0559	0,00245	43	.0036	0,0914	0,00657
.0020	0,0508	0,00203	44	.0032	0,0813	0,00519
.0018	0,0457	0,00164	45	.0028	0,0711	0,00397
.0016	0,0406	0,00129	46	.0024	0,0610	0,00292
.0014	0,0350	0,00109	47	.0020	0,0508	0,00203
.0012	0,0305	0,000731	48	.0016	0,0406	0,00129
.0011	0,0279	0,000611	49	.0012	0,0305	0,000731
.0010	0,0254	0,000507	50	.0010	0,0254	0,000507
.00088	0,0224	0,000394	51	–	–	–
.00078	0,0198	0,000308	52	–	–	–
.00070	0,0178	0,000249	53	–	–	–
.00062	0,0158	0,000194	54	–	–	–
.00055	0,0140	0,000154	55	–	–	–
.00049	0,0124	0,000121	56	–	–	–

Conversion of Mils and Millimeters

Mils to Millimeters

MILS	MILLI-METERS	MILS	MILLI-METERS
1	0,0254	51	1,2954
2	0,0508	52	1,3208
3	0,0762	53	1,3462
4	0,1016	54	1,3716
5	0,1270	55	1,3970
6	0,1524	56	1,4224
7	0,1778	57	1,4478
8	0,2032	58	1,4732
9	0,2286	59	1,4986
10	0,2540	60	1,5240
11	0,2794	61	1,5494
12	0,3048	62	1,5748
13	0,3302	63	1,6002
14	0,3556	64	1,6256
15	0,3810	65	1,6510
16	0,4064	66	1,6764
17	0,4318	67	1,7018
18	0,4572	68	1,7272
19	0,4826	69	1,7526
20	0,5080	70	1,7780
21	0,5334	71	1,8034
22	0,5588	72	1,8288
23	0,5842	73	1,8542
24	0,6096	74	1,8796
25	0,6350	75	1,9050
26	0,6604	76	1,9304
27	0,6858	77	1,9558
28	0,7112	78	1,9812
29	0,7366	79	2,0066
30	0,7620	80	2,0320
31	0,7874	81	2,0574
32	0,8128	82	2,0828
33	0,8382	83	2,1082
34	0,8636	84	2,1336
35	0,8890	85	2,1590
36	0,9144	86	2,1844
37	0,9398	87	2,2098
38	0,9652	88	2,2352
39	0,9906	89	2,2606
40	1,0160	90	2,2860
41	1,0414	91	2,3114
42	1,0668	92	2,3368
43	1,0922	93	2,3622
44	1,1176	94	2,3876
45	1,1430	95	2,4130
46	1,1684	96	2,4384
47	1,1938	97	2,4638
48	1,2192	98	2,4892
49	1,2446	99	2,5146
50	1,2700	100	2,5400

Millimeters to Mils

MILLI-METERS	MILS	MILLI-METERS	MILS
1	39.370	51	2007.87
2	78.740	52	2047.24
3	118.110	53	2086.61
4	157.48	54	2125.98
5	196.85	55	2165.35
6	236.22	56	2204.72
7	275.69	57	2244.09
8	314.96	58	2283.46
9	354.33	59	2322.83
10	393.70	60	2362.20
11	433.07	61	2401.57
12	472.44	62	2440.94
13	511.81	63	2480.31
14	515.18	64	2519.68
15	590.55	65	2559.05
16	629.92	66	2598.42
17	669.29	67	2637.79
18	708.66	68	2677.16
19	748.03	69	2716.53
20	787.40	70	2755.90
21	826.77	71	2795.27
22	866.14	72	2834.64
23	905.51	73	2874.01
24	944.88	74	2913.38
25	984.25	75	2952.75
26	1023.60	76	2992.12
27	1063.00	77	3031.49
28	1102.40	78	3070.86
29	1141.70	79	3110.23
30	1181.10	80	3149.60
31	1220.50	81	3188.97
32	1259.80	82	3228.34
33	1299.20	83	3267.71
34	1338.60	84	3307.08
35	1378.00	85	3346.45
36	1417.32	86	3385.82
37	1456.69	87	3425.19
38	1496.10	88	3464.56
39	1535.40	89	3503.93
40	1574.80	90	3543.30
41	1614.17	91	3582.67
42	1653.54	92	3622.04
43	1692.91	93	3661.41
44	1732.28	94	3700.78
45	1771.65	95	3740.15
46	1811.02	96	3779.52
47	1850.39	97	3818.89
48	1889.76	98	3858.26
49	1929.13	99	3897.63
50	1968.50	100	3937.00

METRIC

some Universal Numbers

MM	Frac.	Inches	MM	Frac.	Inches	MM	Frac.	Inches	MM	Frac.	Inches
.01		.0004	8.3344	21/64	.3281	21.4312	27/32	.8437	57		2.244
.02		.0008	8.7312	11/32	.3437	21.8281	55/64	.8594	58		2.283
.03		.0012	**9.000**		.3543	**22.000**		.8661	59		2.323
.04		.0016	9.1281	23/64	.3594	22.2250	**7/8**	**.875**	**60**		2.362
.05		.0020	9.525	**3/8**	**.375**	22.6219	57/64	.8906	61		2.402
.06		.0024	9.9219	25/64	.3906	**23.000**		.9055	62		2.441
.07		.0028	**10.000**		.3937	23.0187	29/32	.9062	63		2.480
.08		.0032	10.3187	13/32	.4062	23.4156	59/64	.9219	64		2.520
.09		.0035	10.7156	27/64	.4219	23.8125	15/16	.9375	**65**		2.559
.10		.004	**11.000**		.4331	**24.000**		.9449	66		2.598
.20		.008	11.1125	7/16	.4375	24.2094	61/64	.9531	67		2.638
.30		.012	11.5094	29/64	.4531	24.6062	31/32	.9687	68		2.677
.3969	**1/64**	**.0156**	11.9062	15/32	.4687	**25.000**		.9843	69		2.717
.40		.0158	**12.000**		.4724	25.0031	63/64	.9844	**70**		2.756
.50		.0197	12.3031	31/64	.4844	25.400	**1"**	**1.000**	71		2.795
.60		.0236	12.700	**1/2**	**.500**	26		1.024	72		2.835
.70		.0276	**13.000**		.5118	27	1-1/16	1.063	73		2.874
.7937	**1/32**	**.0312**	13.0968	33/64	.5156	28		1.102	74		2.913
.80		.0315	13.4937	17/32	.5312	29		1.142	**75**	2-61/64	2.953
.90		.0354	13.8906	35/64	.5469	**30**		1.181	76		2.992
1.000		.0394	**14.000**		.5512	31		1.220	77	3-1/32	3.031
1.1906	3/64	.0469	14.2875	**9/16**	**.5625**	32		1.260	78		3.071
1.5875	**1/16**	**.0625**	14.6844	37/64	.5781	33		1.299	79		3.110
1.9844	5/64	.0781	**15.000**		.5906	34		1.339	**80**		3.150
2.000		.0787	15.0312	19/32	.5937	**35**		1.378	81		3.189
2.3812	3/32	.0937	15.4781	39/64	.6094	36		1.417	82		3.228
2.7781	7/64	.1094	15.875	**5/8**	**.625**	37		1.457	83		3.268
3.000		.1181	**16.000**		.6299	38		1.496	84		3.307
3.175	**1/8**	**.125**	16.2719	41/64	.6406	39		1.535	**85**		3.346
3.5719	9/64	.1406	16.6687	21/32	.6562	**40**		1.575	86		3.386
3.9687	5/32	.1562	**17.000**		.6693	41		1.614	87		3.425
4.000		.1575	17.0656	43/64	.6719	42		1.654	88		3.465
4.3656	11/64	.1719	17.4625	11/16	.6875	43		1.693	89		3.504
4.7625	**3/16**	**.1875**	17.8594	45/64	.7031	44		1.732	**90**		3.543
5.000		.1969	**18.000**		.7087	**45**		1.772	91		3.583
5.1594	13/64	.2031	18.2562	23/32	.7187	46		1.811	92		3.622
5.5562	7/32	.2187	18.6532	47/64	.7344	47		1.850	93		3.661
5.9531	15/64	.2344	**19.000**		.748	48	1-57/64	1.890	94		3.701
6.000		.2362	19.050	**3/4**	**.750**	49		1.929	**95**		3.740
6.3500	**1/4**	**.250**	19.4469	49/64	.7656	**50**		1.969	96		3.780
6.7469	17/64	.2656	19.8433	25/32	.7812	51		2.008	97		3.819
7.000		.2756	**20.000**		.7874	52		2.047	98		3.858
7.1437	9/32	.2812	20.2402	51/64	.7969	53		2.087	99		3.898
7.5406	19/64	.2969	20.6375	13/16	.8125	54		2.126	**100**	3-15/16	3.937
7.9375	**5/16**	**.3125**	**21.000**		.8268	**55**		2.165			
8.000		.315	21.0344	53/64	.8281	56		2.205			

Universal Components — 213-641-4255

FAX: 213-641-6312

650/7.00

Bulletin 518-R

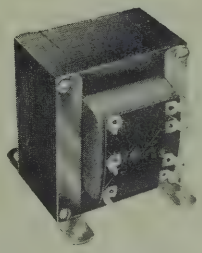
8 STANCOR Power Supply

Transformers for use with Sarkes-Tarzian Stock Selenium Rectifiers

All of these transformers will operate in Full-Wave Center-Tapped or Bridge Type Circuits with readily available stock sizes of Selenium Rectifiers

STANCOR Part No.	Sarkes-Tarzian Part No.
RT-201	D-10 / D-52
RT-202	D-11 / D-17
RT-204	D-13 / D-18
RT-206	D-14 / D-19
RT-208	D-15 / D-20
RT-408	D-16 / D-21
RT-2012	D-27
RT-4012	D-28

Tarzian / STANCOR



Each transformer has the winding arrangement and terminal numbering shown in the schematic diagrams above.

The primary winding is connected to terminals 1, 2, 3 & 4. A separate winding is connected to terminals 5, 6 & 7 that may be used in series with the primary to raise or lower the secondary voltage output. A variety of combinations is possible using the taps on both windings, plus the "Aiding" or "Bucking" action of the extra winding.

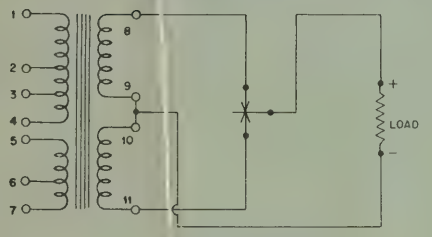
Designed for 117 V. 50/60 cycle operation; may also be satisfactorily operated at 400 cycles.

The secondary winding of each transformer consists of two identical windings connected to terminals 8 & 9 and to 10 & 11 respectively. Use the tables showing the various output voltages for specific terminal connections as your guide. Many combinations are possible other than those listed in the tables.

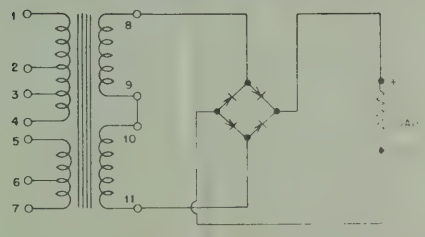
All ratings shown are for normal convection air cooled applications. Select only rectifiers capable of handling the output voltages and currents described

Common schematics for the complete RT series

FULL-WAVE C. T.



FULL-WAVE BRIDGE



RT-201

Stancor Power Supply		Full-Wave C. T.				Full-Wave Bridge			
		Use with Sarkes-Tarzian Selenium Rectifier Part Nos. D-10				D-52			
		Output 2.0 A. D.C.				Output 1.25 A. D.C.			
		Resistive Load		Capacitive Load		Resistive Load		Capacitive Load	
Input 117vac Term. No.	Connect Term. No.	Secondary Volts AC	Output Volts DC	Secondary Volts AC	Output Volts DC	Secondary Volts AC	Output Volts DC	Secondary Volts AC	Output Volts DC
1-2	—	29.4	11.2	28.8	13.8	28.5	23.0	27.9	30.0
1-7	2-6	26.0	9.8	25.7	11.7	25.4	20.8	25.1	26.4
1-6	2-5	23.0	8.4	22.7	9.9	22.3	17.3	21.8	22.2
1-7	2-5	20.9	7.4	20.8	8.6	20.2	15.4	19.8	19.7
1-3	—	19.4	6.7	19.1	7.6	18.6	13.9	18.2	17.5
1-7	3-6	17.8	6.1	17.6	6.7	17.2	12.8	16.8	15.7
1-6	3-5	16.3	5.3	16.1	6.0	15.7	11.2	15.2	13.6
1-7	3-5	14.9	4.7	14.8	5.3	14.3	10.2	14.1	12.4
1-4	—	14.2	4.4	14.2	5.0	13.7	9.7	13.5	11.6
1-7	4-6	13.4	4.0	13.3	4.4	12.7	8.8	12.5	10.4
1-6	4-5	12.4	3.6	12.4	3.9	11.7	7.9	11.7	9.5
1-7	4-5	11.7	3.3	11.7	3.5	11.1	7.4	11.1	8.7

*1000 MFD. **500 MFD.

RT-202

Stancor Power Supply		Full-Wave C. T.				Full-Wave Bridge			
		Use with Sarkes-Tarzian Selenium Rectifier Part Nos. D-11				D-17			
		Output 4.0 A. D.C.				Output 2.0 A. D.C.			
		Resistive Load		Capacitive Load*		Resistive Load		Capacitive Load**	
Input 117vac Term. No.	Connect Term. No.	Secondary Volts AC	Output Volts DC	Secondary Volts AC	Output Volts DC	Secondary Volts AC	Output Volts DC	Secondary Volts AC	Output Volts DC
1-2	—	29.7	11.1	29.3	14.7	29.7	24.3	29.3	33.0
1-7	2-6	26.2	9.8	26.0	12.6	26.2	21.5	26.0	29.0
1-6	2-5	24.4	8.8	24.0	11.3	24.3	19.5	23.9	26.0
1-7	2-5	21.9	7.8	21.7	9.9	21.8	17.6	21.5	23.1
1-3	—	20.9	7.4	20.7	9.3	20.9	16.6	20.6	21.7
1-7	3-6	19.2	6.6	18.9	8.2	19.1	15.1	18.9	19.6
1-6	3-5	18.0	6.1	17.8	7.5	18.0	14.2	17.8	18.2
1-7	3-5	16.6	5.5	16.4	6.6	16.6	12.8	16.4	16.3
1-4	—	14.4	4.4	14.2	5.3	14.4	10.8	14.2	13.7
1-7	4-6	13.5	4.1	13.4	4.9	13.5	10.1	13.4	12.6
1-6	4-5	12.9	3.9	12.7	4.4	12.9	9.5	12.7	11.7
1-7	4-5	12.2	3.7	12.0	4.0	12.2	8.9	12.0	10.8

*2000 MFD. **1000 MFD.

RT-204

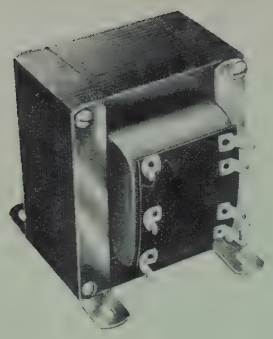
Stancor Power Supply		Full-Wave C. T.				Full-Wave Bridge			
		Use with Sarkes-Tarzian Selenium Rectifier Part Nos. D-13				D-18			
		Output 8.0 A. D.C.				Output 4.0 A. D.C.			
		Resistive Load		Capacitive Load*		Resistive Load		Capacitive Load**	
Input 117vac Term. No.	Connect Term No.	Secondary Volts AC	Output Volts DC	Secondary Volts AC	Output Volts DC	Secondary Volts AC	Output Volts DC	Secondary Volts AC	Output Volts DC
1-2	—	29.2	12.0	28.8	14.5	29.2	24.0	29.0	32.4
1-7	2-6	25.7	10.5	25.7	12.6	25.7	21.1	25.4	29.2
1-6	2-5	22.8	9.2	22.8	10.9	22.8	18.7	22.7	25.7
1-7	2-5	20.6	8.3	20.6	9.9	20.7	16.6	20.6	22.8
1-3	—	19.3	7.7	19.3	8.7	19.4	15.4	19.0	21.0
1-7	3-6	17.6	7.0	17.6	7.8	17.8	14.0	17.6	19.0
1-6	3-5	16.2	6.3	16.2	6.9	16.3	12.7	16.1	17.2
1-7	3-5	15.0	5.8	15.0	6.3	15.1	11.6	14.9	15.6
1-4	—	14.2	5.4	14.2	5.8	14.4	11.0	14.2	14.8
1-7	4-6	13.3	5.0	13.3	5.3	13.4	10.2	15.3	13.5
1-6	4-5	12.5	4.6	12.5	4.9	12.6	9.4	12.5	12.4
1-7	4-5	11.7	4.3	11.7	4.5	11.8	8.8	11.6	11.4

*4000 MFD **2000 MFD.

SEE OTHER SIDE FOR STANCOR Part Nos. RT-206, 208, 2012, 408, 4012
Starkes-Tarzian Part Nos. D-14, 19, 15, 20, 16, 21, 27, 28

SARKES-TARZIAN RECTIFIER DIVISION
415 North College Avenue, Bloomington, Indiana

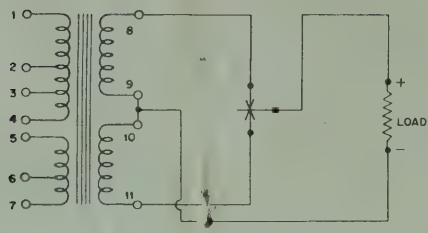
STANCOR ELECTRONICS INC.
3501 West Addison Street, Chicago 18, Illinois



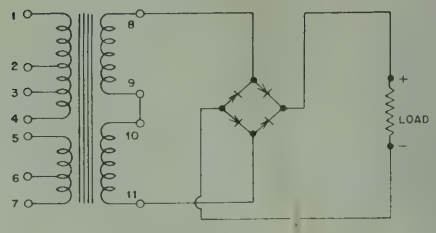
Tarzian / STANCOR

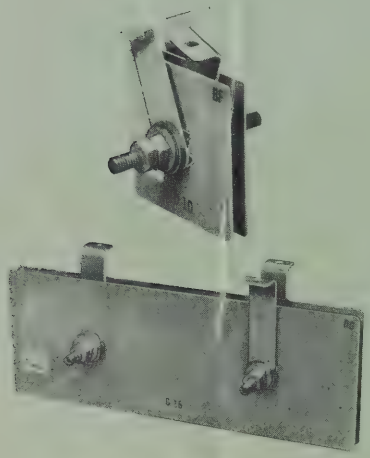
Common schematics for the complete RT series

FULL-WAVE C. T.



FULL-WAVE BRIDGE





Each transformer has the winding arrangement and terminal numbering shown in the schematic diagrams above.

The primary winding is connected to terminals 1, 2, 3 & 4. A separate winding is connected to terminals 5, 6 & 7 that may be used in series with the primary to raise or lower the secondary voltage output. A variety of combinations is possible using the taps on both windings, plus the "Aiding" or "Bucking" action of the extra winding.

Designed for 117 V. 50/60 cycle operation; may also be satisfactorily operated at 400 cycles.

The secondary winding of each transformer consists of two identical windings connected to terminals 8 & 9 and to 10 & 11 respectively. Use the tables showing the various output voltages for specific terminal connections as your guide. Many combinations are possible other than those listed in the tables.

All ratings shown are for normal convection air cooled applications. Select only rectifiers capable of handling the output voltages and currents described

RT-206 — Full-Wave C. T. / Full-Wave Bridge

Use with Sarkes-Tarzian Selenium Rectifier Part Nos. **D-14** / **D-19**

Stancor Power Supply		Output 12.0 A. D.C.				Output 6.0 A. D.C.			
		Resistive Load		Capacitive Load*		Resistive Load		Capacitive Load**	
Input 117vac Term. No.	Connect Term. No.	Secondary Volts AC	Output Volts DC	Secondary Volts AC	Output Volts DC	Secondary Volts AC	Output Volts DC	Secondary Volts AC	Output Volts DC
1-2	---	11.8	11.5	29.6	14.4	29.6	24.0	29.2	32 0
1-7	2-6	25.0	9.9	25.8	12.0	25.8	20.6	25.4	27.3
1-6	2-5	23 8	8.8	23.6	10.7	23.8	18.6	23 6	24.6
1 7	2-5	21.2	7.6	21.0	9.0	21 2	16.4	21.0	21.4
1-3	---	19.7	7.0	19.7	8.4	19.7	15.2	19 4	19.2
1-7	3-6	17.9	6.2	17.8	7.2	17.9	13.5	17 8	17 3
1-6	3-5	16 7	5.7	16.6	6.6	16.8	12 5	16.6	15.8
1-7	3-5	15.4	5.1	15.4	5.9	15 4	11.4	15.2	14.0
1-4	---	14.6	4.7	14 5	5.2	14.6	10.6	14.5	13.4
1-7	4-6	13.5	4.2	13.4	4.7	13.5	9.8	13.4	12.0
1-6	4-5	12.9	3.9	12.8	4.3	12.9	9.2	12 8	11 0
1-7	4-5	12.0	8.4	12.0	3.9	12.0	8.4	12 0	10.0

*6000 MFD. **3000 MFD.

RT-208 — Full-Wave C. T. / Full-Wave Bridge

Use with Sarkes-Tarzian Selenium Rectifier Part Nos. **D-15** / **D-20**

Stancor Power Supply		Output 15.0 A. D.C.				Output 8.0 A. D.C.			
		Resistive Load		Capacitive Load*		Resistive Load		Capacitive Load**	
Input 117vac Term No.	Connect Term No.	Secondary Volts AC	Output Volts DC	Secondary Volts AC	Output Volts DC	Secondary Volts AC	Output Volts DC	Secondary Volts AC	Output Volts DC
1-2	---	29.2	11.4	29.2	14.8	29.2	23.7	29.0	32.5
1-7	2-6	25.4	9.9	25 4	12.5	25.3	21.0	25.2	27.0
1-6	2-5	24.1	9.3	24.0	11.6	24.0	19.4	23.9	25.5
1-7	2-5	21.5	8.2	21.5	10.0	21.5	17.0	21.3	22.0
1-3	---	19 3	7.1	19.3	8.7	19.1	14.9	19.1	21 2
1-7	3 6	17.6	6.4	17.5	7.7	17.4	13.4	17.4	17 0
1-6	3-5	16.8	6.0	16.8	7.2	16.8	12.9	16.7	16 1
1-7	3-5	15.6	5.5	15.5	6 5	15.4	11.7	15 4	14.5
1-4	---	14.4	5.0	14.4	5.7	14.2	10.7	14.2	13 1
1-7	4-6	13.4	4.5	13.4	5.1	13.3	9.8	13.3	11.9
1 6	4-5	13.0	4.3	12.9	4.8	12.9	9.5	12.8	11.4
1-7	4-5	12.2	3.9	12.1	4.4	12 1	8.7	12.1	10.4

*7500 MFD **4000 MFD.

RT-2012 — Full-Wave C. T. / Full-Wave Bridge

Use with Sarkes-Tarzian Selenium Rectifier Part Nos. **D-16** / **D-21**

Stancor Power Supply		Output 22.5 A. D.C.				Output 12.0 A. D.C.			
		Resistive Load		Capacitive Load*		Resistive Load		Capacitive Load**	
Input 117vac Term. No.	Connect Term. No.	Secondary Volts AC	Output Volts DC	Secondary Volts AC	Output Volts DC	Secondary Volts AC	Output Volts DC	Secondary Volts AC	Output Volts DC
1-2	---	29.1	11.4	28.8	14.3	29.0	23.5	28.7	33.0
1-7	2-6	25.2	9.7	25.1	12.0	25.3	20.4	25.1	28.0
1-6	2-5	23.6	8.9	23.6	10 9	23.5	18 8	23.5	25 7
1-7	2-5	21 1	7.7	21.0	9.4	21 0	16.3	20.9	22.3
1-3	---	19 3	7.2	19.3	8.3	19.2	14.8	19.2	20.2
1-7	3-6	17.7	6.3	17.7	7.2	17 5	13.4	17 5	17.7
1-6	3-5	16 9	6.0	16.9	6.7	16.8	12.5	16.8	16.7
1-7	3-5	15.6	5.4	15.7	5.9	15.5	11 5	15.5	15.1
1-4	---	14.6	4.9	14.6	5.4	14.5	10.7	14.5	13.7
1-7	4-6	13.5	4.4	13.5	4.7	13 5	9.7	13.4	12.6
1-6	4-5	13 0	4.3	13.0	4.5	13.0	9 3	13.0	11.9
1-7	4 5	12 2	3.9	12.1	4.0	12 2	8 6	12.0	10.8

*11,250 MFD. **6000 MFD.

RT-408 FULL-WAVE BRIDGE / RT-4012 FULL-WAVE BRIDGE

Use with Sarkes-Tarzian Selenium Rectifier Part Nos. **D-27** / **D-28**

Stancor Power Supply		Output 8.0 A. D.C.				Output 12.0 A. D.C.			
		Resistive Load		Capacitive Load*		Resistive Load		Capacitive Load**	
Input 117vac Term. No.	Connect Term No.	Secondary Volts AC	Output Volts DC	Secondary Volts AC	Output Volts DC	Secondary Volts AC	Output Volts DC	Secondary Volts AC	Output Volts DC
1 2	---	53 5	44.0	53 0	63.0	53.0	43 5	53 0	60 0
1 7	2-6	50 0	40.5	50.0	59 0	49 5	40 0	49.0	55 0
1-6	2-5	45 2	37.0	45.0	52 0	43 5	34.0	43.0	48.0
1 7	2-5	42.5	34.5	42.0	48 0	41.5	32.0	41 0	45.5
1 3	---	37.5	30.5	37 5	40.0	37.5	29 0	37.0	40 0
1-7	3-6	35.5	27 5	35 5	39 0	35 5	27.0	35.0	37.5
1-6	3 5	32.5	25.0	33.0	35.5	32.6	24.0	32 7	34.0
1-7	3-5	31.5	24.0	31.5	31.5	31 0	23.0	30.6	31.0
1-4	---	29 0	21.5	29.0	29.5	29 0	21 2	29 9	29.0
1-7	4-6	27 5	20.5	27.5	28.0	27 8	20 0	28.0	28 0
1-6	4-5	26.0	19.5	26.0	26.0	26 0	19.0	26.0	25 0
1 7	4-5	25.0	18.0	25.0	25.0	25.0	18 0	25.0	24.0

*4000 MFD. **6000 MFD.

SARKES-TARZIAN RECTIFIER DIVISION
415 North College Avenue, Bloomington, Indiana

STANCOR ELECTRONICS INC.
3501 West Addison Street, Chicago 18, Illinois

STANCOR SERVICE DATA

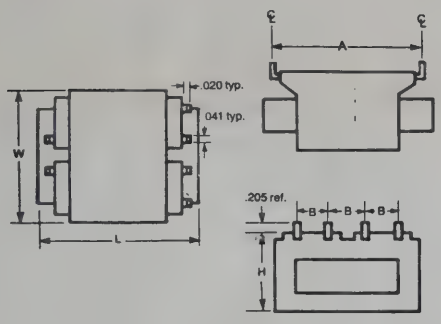
131 GODFREY STREET • LOGANSPORT, IN 46947

UNITED TECHNOLOGIES CONTROL SYSTEMS

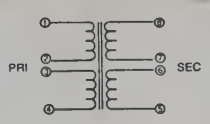
PART NO. **LB SERIES**

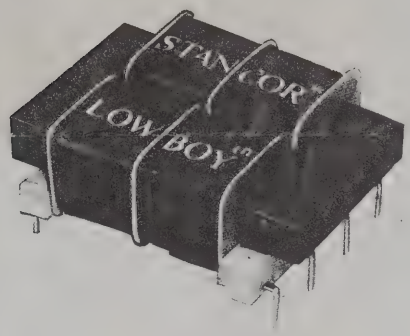
TYPE: **LOW BOY POWER TRANSFORMER**

OUTLINE DIMENSIONS



Circuit Diagram





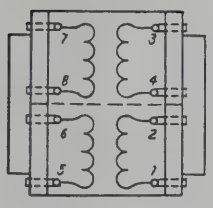
U.L. RECOGNIZED UNIT.
(File Card E-68100)

LOW BOY APPLICATIONS:
Electronic Game Systems.
Computer Peripherals.
Switching Power Supplies.
Medical Electronics.
Instrumentation Equipment.
Telephone Modems.
Communications Equipment.
Computer "On Board" Power.
Machine Control Logic Systems.
ROBOTICS.
Consumer Electronics.

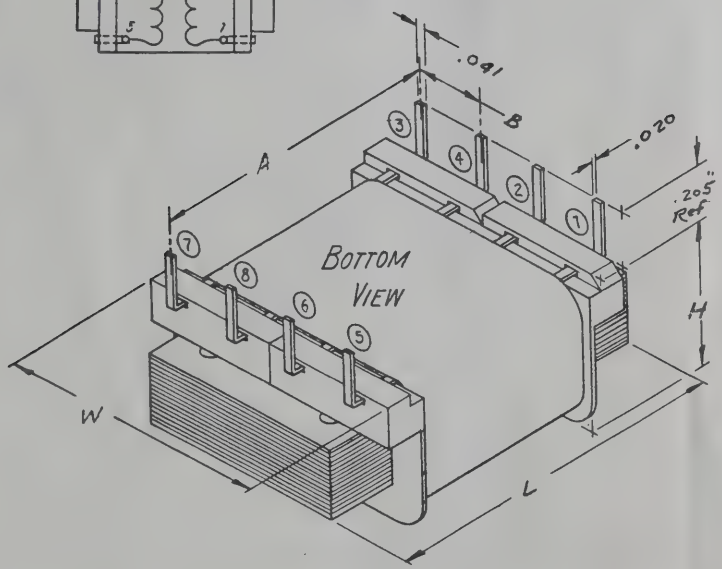
Output Watts	H	W	L	A	B
2, 3	.625	1.562	1.875	1.600	.375
4, 5, 6	.875	1.562	1.875	1.600	.375
12	1.062	2.000	2.500	2.000	.500

SPECIFICATIONS:
LOW-BOY™ — allow ¾" card spacing for 2 & 3, VA units; 1" for 4, 5 & 6 VA, and 1¼" for 12 VA units.
DUAL PRIMARIES — versatility!! 115/230V, 50/60/400 Hz.
SPLIT BOBBIN — side by side windings — (No static shield)
SEMI-TOROIDAL CONSTRUCTION — Reduces Radiated Magnetic Fields and Results in Balanced Windings.
HI-POT — 2000 volts standard RMS
P.C. TERMINALS — Precision Spaced

BOTTOM VIEW



NOTE
BECAUSE OF THE TORODIAL EFFECT, ONE OF THE WINDINGS MUST BE CONNECTED IN REVERSE IN ORDER TO GET CORRECT POLARITY AND VOLTAGE.



VOLTS & CURRENT

PRIMARY	
SERIES INPUT ACROSS 1 & 4 CONNECT 2 & 3	PARALLEL INPUT ACROSS 1 & 3, 2 & 4
230V.	115V.

SECONDARY	
SERIES OUTPUT ACROSS 5 & 8 CONNECT 6 & 7	PARALLEL OUTPUT ACROSS 5 & 7, 6 & 8
SEE SEC. SERIES	SEC. PARALLEL

SECT	STANCOR Part No.	V.A or Watts	Secondary: Series Output Across 5 & 8 Connect 6 & 7	Secondary: Parallel Output Across 5 & 7, 6 & 8	Wt. Oz.
A	LB210	2	10V C.T. @ 200MA	5V @ 400MA	4.5
	LB310	3	10V C.T. @ 300MA	5V @ 600MA	4.5
	LB410	4	10V C.T. @ 400MA	5V @ 800MA	5.5
	LB510	5	10V C.T. @ 500MA	5V @ 1.A	5.5
	LB610	6	10V C.T. @ 600MA	5V @ 1.2A	5.5
	LB1210	12	10V C.T. @ 1200MA	5V @ 2.4A	11.5
B	LB412	4	12V C.T. @ 333MA	6V @ 667MA	5.5
	LB512	5	12V C.T. @ 417MA	6V @ 833MA	5.5
C	LB612	6	12.6V C.T. @ 450MA	6.3V @ 900MA	5.5
	LB1212	12	12.6V C.T. @ 900MA	6.3V @ 1.8A	11.5
D	LB215	2	15V C.T. @ 150MA	7.5V @ 300MA	4.5
	LB315	3	15V C.T. @ 200MA	7.5V @ 450MA	4.5
E	LB616	6	16V C.T. @ 350MA	8V @ 700MA	5.5
	LB1216	12	16V C.T. @ 700MA	8V @ 1.4A	11.5
F	LB420	4	20V C.T. @ 200MA	10V @ 400MA	5.5
	LB520	5	20V C.T. @ 250MA	10V @ 500MA	5.5
	LB620	6	20V C.T. @ 300MA	10V @ 600MA	5.5
	LB1220	12	20V C.T. @ 600MA	10V @ 1.2A	11.5
G	LB424	4	24V C.T. @ 167MA	12V @ 333MA	5.5
	LB524	5	24V C.T. @ 208MA	12V @ 417MA	5.5
	LB624	6	24V C.T. @ 250MA	12V @ 500MA	5.5
	LB1224	12	24V C.T. @ 500MA	12V @ 1A	11.5
H	LB634	6	34V C.T. @ 170MA	17V @ 340MA	5.5
	LB1234	12	34V C.T. @ 340MA	17V @ 680MA	11.5
I	√LB240	2	40V C.T. @ 60MA	20V @ 120MA	4.5
	√LB640	6	40V C.T. @ 150MA	20V @ 300MA	5.5
	√LB1240	12	40V C.T. @ 300MA	20V @ 600MA	11.5
J	√LB256	2	56V C.T. @ 45MA	28V @ 90MA	4.5
	√LB656	6	56V C.T. @ 100MA	28V @ 200MA	5.5
	√LB1256	12	56V C.T. @ 200MA	28V @ 400MA	11.5
K	√LB288	2	88V C.T. @ 28MA	44V @ 56MA	4.5
	√LB688	6	88V C.T. @ 65MA	44V @ 130MA	5.5
	√LB1288	12	88V C.T. @ 130MA	44V @ 260MA	11.5
L	√LB2120	2	120V C.T. @ 20MA	60V @ 40MA	4.5
	LB4120	4	120V C.T. @ 33MA	60V @ 66MA	5.5
	LB5120	5	120V C.T. @ 41.7MA	60V @ 83.3MA	5.5
	√LB6120	6	120V C.T. @ 50MA	60V @ 100MA	5.5
	√LB12120	12	120V C.T. @ 100MA	60V @ 200MA	11.5
M	√LB2230	2	230V C.T. @ 10MA	115V @ 20MA	4.5
	√LB6230	6	230V C.T. @ 25MA	115V @ 50MA	5.5
	√LB12230	12	230V C.T. @ 50MA	115V @ 100MA	11.5

√New Item.

		PRIMARY — OHMS	SECONDARY — OHMS
SO-13		400/500 C.T. Brn-Red (C.T.)-Blu	40/50 Split Yel-Wht, Blk-Green
	SSO-13	200,000 Blu, Brn	1000 Grn-Base, Blk End.
SO-14		80/100 C.T. Brn-Red (C.T.)-Blu	32/40 Split Yel-Wht, Blk-Green
	SSO-14	10,000/25,000 Blue Red (C.T.) Brn	200/500 Yel, Blk (C.T.) Green
SO-15		600 C.T. Brn-Red (C.T.)-Blu	600 Split Yel-Wht, Blk-Grn
	SSO-15	20,000/30,000 Brn Red (C.T.) Blue	800/1200 Yel, Blk (C.T.) Green
SO-16		2500 C.T. Brn-Red (C.T.)-Blu	2500 Split Yel-Wht, Blk-Grn
	SSO-16	1200/1500 Blu, Rd	3.2/4 Grn, Blk
SO-17		Reactor: Series Connected 16 HYS @ 2 MADC, 8 HYS @ 4 MADC Blu-Red (Join BluW & RW) Parallel Connected 4 HYS @ 4 MADC, 2 HYS @ 8 MADC Blu-BluW, Red-RW	
	SSO-17	10K/12.5K Blu-Coll., Red-B plus	500/600 Yel, Blk (C.T.), Green
	SSO-18	7.5K/9.4K Brn-Rd (C.T.), Blue	3.2/4 Grn, Blk
	SSO-19	500 Brn-Rd (C.T.), Blue	600 Yel, Blk (C.T.), Green
	SSO-20	1.5K Brn, Rd (C.T.), Blue	600 Yel, Blk (C.T.), Green
	SSO-21	200K Brn, Rd (C.T.), Blue	1K Yel, Blk (C.T.), Green
	SSO-22	10K/12K Brn, Rd (C.T.), Blue	1500/1800 Yel, Blk (C.T.), Green
	SSO-23	Reactor 8 HYS @ 2 MADC, 4 HYS @ 5 MADC 650 Red-Gn	
	SSO-24	Reactor 3.5 HYS @ 2 MADC, 1.5 HYS @ 5 MADC 160 Red-Blu	
	SSO-25	10K/12K C.T. Brn-Red (C.T.)-Blue	10K/12K C.T. Yel-Blk (C.T.) Green
	SSO-26	40K/50K C.T. Brn-Red (C.T.)-Blue	400/500 Split Yel-Wht, Blk-Green
	SSO-27	4000 C.T. Brn-Red (C.T.)-Blue	600 Split Yel-Wht, Blk-Grn

(over)

SUB-OUNCER and SUB-SUBOUNCER COLOR CODE

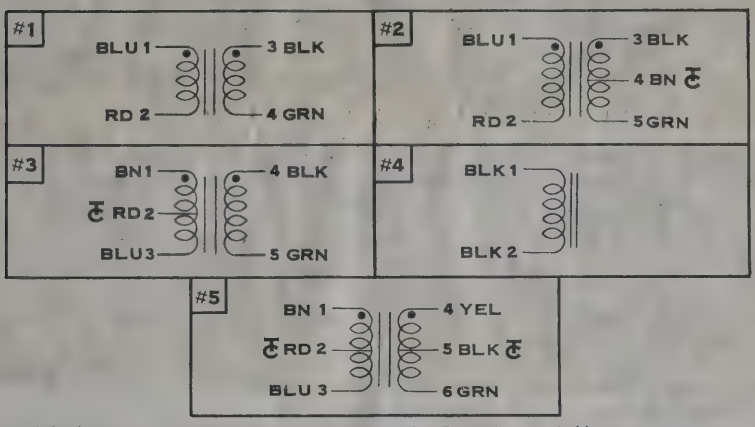
		PRIMARY — OHMS	SECONDARY — OHMS
SO-1	SSO-1	50/200 Red Red	62,500/250,000 Green-Grid Black-Fil.
SO-2	SSO-2	10,000 Blue-Plate Red-B plus	90,000 Green-Grid Black-Fil.
SO-3	SSO-3	10,000/25,000 Blue-Plate Red-B plus	200/500 Black Black
SO-4	SSO-4	30,000 Blue-Plate Red-B plus	50 Brown Brown
SO-6	SSO-6	100,000 Blue-Plate Red-B plus	60 Brown Black
SO-7	SSO-7	20,000/30,000 Blue-Collector Red-Base	800/1200 Green-Emitter Black-Ground-Base
SO-8	SSO-8	10,000 Blue-Coll., Red-B plus	2000 C.T. Grn Base, Blk Gnd C.T., Brn-Base
SO-9		500 C.T. Blu-Coll., Red-B plus C.T., Brn-Coll.	3.2 Wht, Blk
	SSO-9	10,000 Blu-Coll., Red-B plus	16 Wht, Blk
SO-10		Red (C.T.) Brn 2000/4000 Blue	8/16 Blk, Green
	SSO-10	10,000 Blu-Coll., Red-B plus	3.2 Wht, Blk
SO-11		400/500 C.T. Brn-Red (C.T.)-Blu	400/500 Split Yel-Wht, Blk-Green
	SSO-11	500/600 Blu-Coll., Red-B plus	50/60 Grn, Blk
SO-12		400/500 C.T. Brn-Red (C.T.)-Blu	120/150 Split Yel-Wht, Blk-Green
	SSO-12	1000/1200 Blu-Coll., Red-B plus	50/60 Grn, Blk

(over)

PF

TERMINAL ARRANGEMENTS

ULTRA MINIATURE SERIES



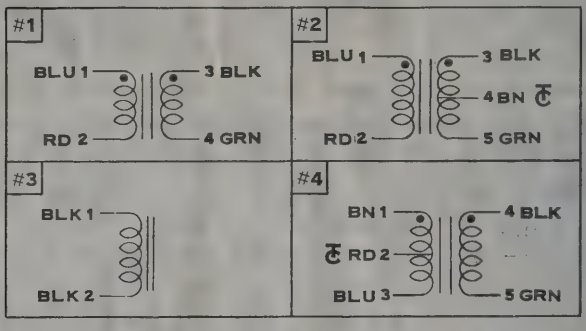
Molded Units—white dot is terminal #1, others follow numerically in clockwise direction.

PART NO.	CONNECTIONS		SCHEMATIC NO
	Pri. Imped.	Sec. Imped.	
UM21	100K 1-2	1,000 3-4	1
UM22	20K 1-2	1,000 3-4	1
UM23	20K 1-2	1,200 C.T. 3-4-5	2
UM24	1,000 1-2	50 3-4	1
UM25	400 1-2	50 3-4	1
UM26	400 1-2	11 3-4	1
UM27	400 C.T. 1-2-3	11 4-5	3
UM28	10 HY ODC 1-2	8 HY 0.5 MA DC 1-2 600 DCR	4
UM29	600 C.T. 1-2-3	600 C.T. 4-5-6	5
UM30	1.5 HY ODC 1-2	0.7 HY 2 MA DC 100 DCR	4
UM31	10,000 C.T. 1-2-3	1,200 C.T. 4-5-6	5
UM32	1,500 C.T. 1-2-3	600 4-5	3
UM33	1,000 C.T. 1-2-3	600 4-5	3
UM34	10,000 C.T. 1-2-3	600 C.T. 4-5-6	5
UM35	15,000 C.T. 1-2-3	15,000 C.T. 4-5-6	5
UM36	20,000 C.T. 1-2-3	800 C.T. 4-5-6	5
UM37	10,000 1-2	2,000 C.T. 3-4-5	2
UM39	2,500 C.T. 1-2-3	600 C.T. 4-5-6	5

MICROTRAN COMPANY, INC.
145 EAST MINEOLA AVENUE
VALLEY STREAM, NEW YORK
516 LO 1-6050

TERMINAL ARRANGEMENTS

VERI-MINIATURE SERIES



Terminal colors are only applicable to open frame units.
Terminal numbers apply to cased and molded units.

PART NO.	CONNECTIONS		SCHEMATIC NO
	Pri. Imped.	Sec. Imped.	
VM1	50 1-2	600 3-4	1
VM2	200K 1-2	600 3-4	1
VM3	25K 1-2	600 3-4	1
VM4	200K 1-2	1,200 3-4	1
VM5	50K 1-2	600 3-4	1
VM6	100K 1-2	1,200 C.T. 3-4-5	2
VM7	500 1-2	3.4 3-4	1
VM8	1,250 1-2	3.4 3-4	1
VM9	1,250 1-2	50 3-4	1
VM10	2,500 1-2	2,500 C.T. 3-4-5	2
VM11	20 HY 0 DC 1-2	12 HY 0.5 MA DC 1000 DCR	3
VM12	20K 1-2	1,000 3-4	1
VM13	20K 1-2	1,000 C.T. 3-4-5	2
VM14	600 C.T. 1-2-3	600 C.T. 4-5-6	4
VM15	50,000 C.T. 1-2-3	50,000 C.T. 4-5-6	4
VM16	500 C.T. 1-2-3	250 C.T. 4-5-6	4
VM17	10,000 C.T. 1-2-3	5,000 C.T. 4-5-6	4

MICROTRAN COMPANY, INC.
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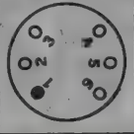
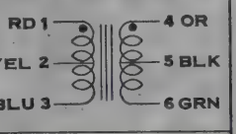
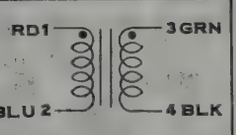
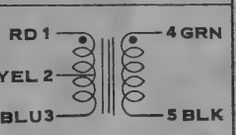
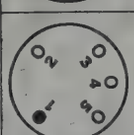
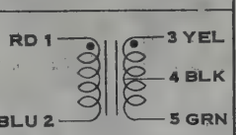
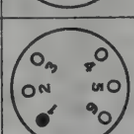
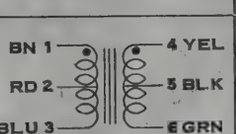
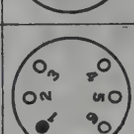
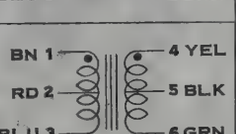
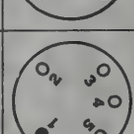
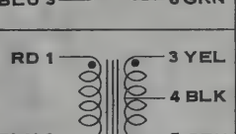
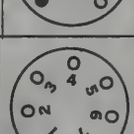
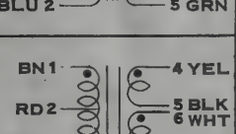
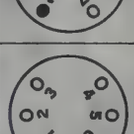
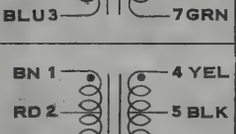
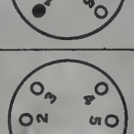
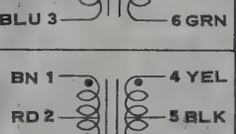
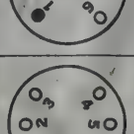
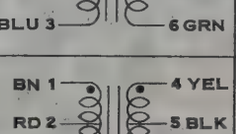
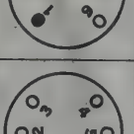
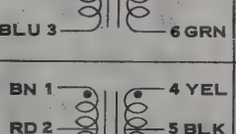
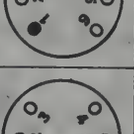
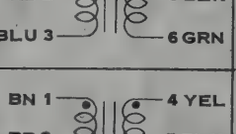
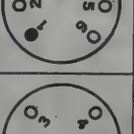
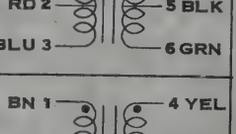
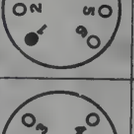
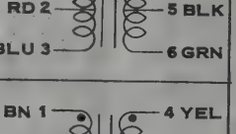
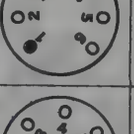
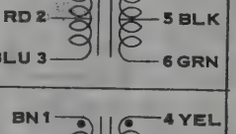
TERMINAL ARRANGEMENTS

MICRO MINIATURE SERIES

Part No.	Connections		Terminal* Layout	Schematic**
	Prl. Imped.	Sec. Imped.		
MMT11	4000Ω CT 1-2-3	600Ω CT 4-5-6		
MMT12	2000Ω 1-2	3.4Ω 3-4		
MMT13	4000Ω CT 1-2-3	3.4Ω 4-5		
MMT16	10,000Ω 1-2	1,500Ω CT 3-4-5		
MMT17	10,000Ω CT 1-2-3	200Ω CT 4-5-6		
MMT18	25,000Ω CT 1-2-3	1,200Ω CT 4-5-6		
MMT19	2,500Ω 1-2	2,500Ω CT 3-4-5		
MMT21	4000Ω CT 1-2-3	600 SPLIT 150Ω 4-5 6-7		
MMT25	7500Ω CT 1-2-3	600Ω CT 4-5-6		
MMT26	600Ω CT 1-2-3	600Ω CT 4-5-6		
MMT27	25,000Ω CT 1-2-3	600Ω CT 4-5-6		
MMT28	10,000Ω CT 1-2-3	1500Ω CT 4-5-6		
MMT29	10,000Ω CT 1-2-3	10,000Ω CT 4-5-6		
MMT30	7,500Ω CT 1-2-3	1,200Ω CT 4-5-6		
MMT31	2,000Ω CT 1-2-3	500Ω CT 4-5-6		
MMT32	600Ω CT 1-2-3	1200Ω/300Ω SPLIT 4-5 & 6-7		

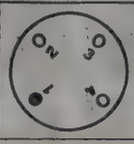
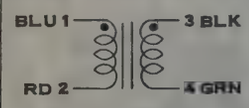
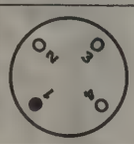
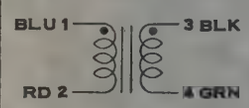
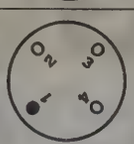
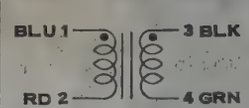
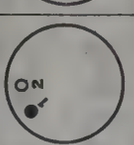
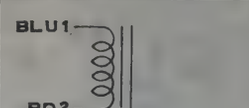
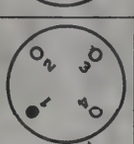
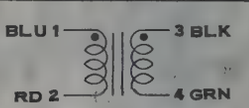
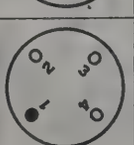
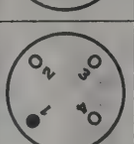
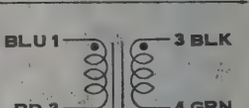
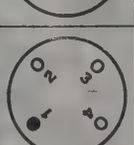
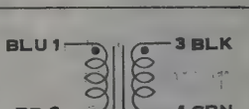
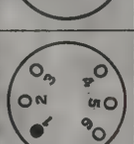
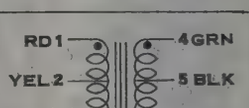
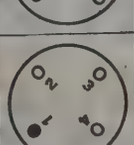
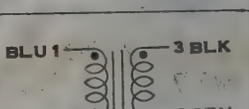
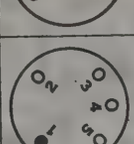
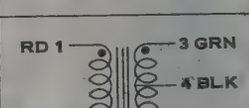
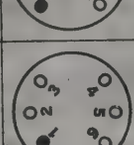
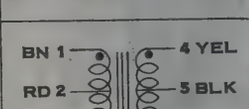
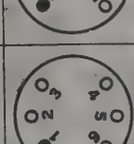
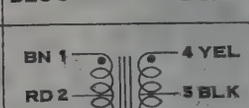
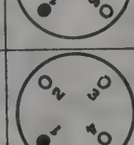
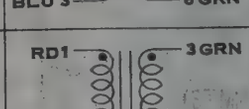
*NOTE: On hermetically sealed units only, Pin 1 may be marked by number or color. Numbers increase in clockwise direction.

**Terminal colors are only applicable to open frame units.

Terminal numbers apply to metal cased and molded units.

TERMINAL ARRANGEMENTS

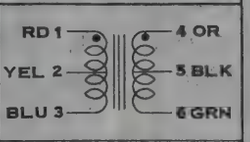
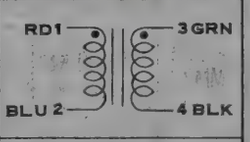
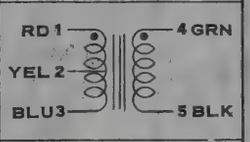
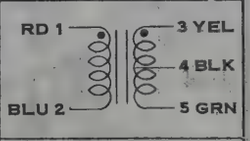
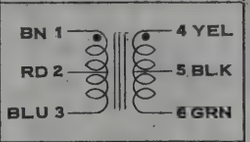
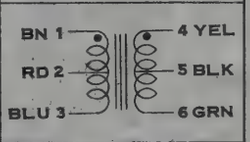
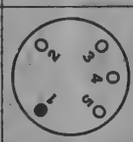
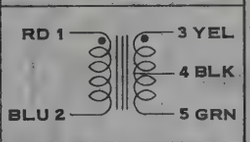
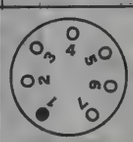
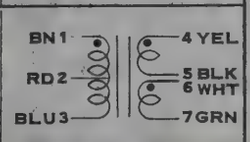
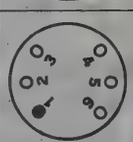
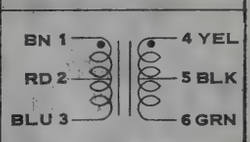
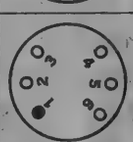
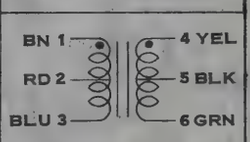
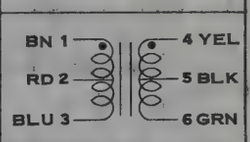
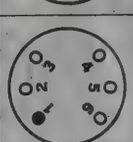
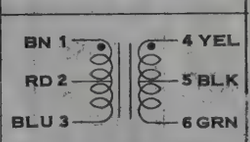
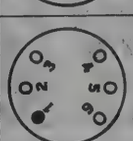
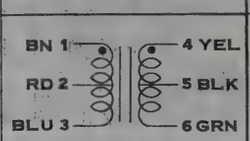
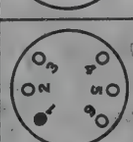
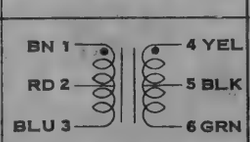
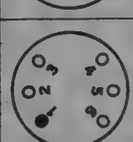
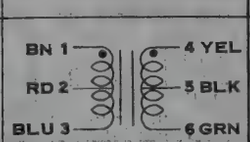
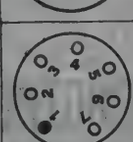
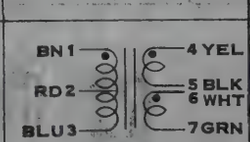
MICRO MINIATURE SERIES

Part No.	Connections		Terminal* Layout	Schematic**
	Pri. Imped.	Sec. Imped.		
MM1	200Ω 50Ω 1-2	250,000Ω 62,000Ω 3-4		
MM2	10,000Ω 1-2	90,000Ω 3-4		
MM3	10,000Ω 1-2	200Ω 3-4		
MM4	30,000Ω 1-2	50Ω 3-4		
MM5	50 hy @ 1 MIL DC 1-2	4700Ω D.C. RES.		
MM6	100,000Ω 1-2	60Ω 3-4		
MM7	30,000Ω 1-2	1,200Ω 3-4		
MMT1	600Ω 1-2	600Ω 3-4		
MMT3	50,000Ω 1-2	600Ω 3-4		
MMT4	50,000Ω CT 1-2-3	600Ω CT 4-5-6		
MMT5	50,000Ω 1-2	6Ω 3-4		
MMT7	25,000Ω 1-2	1200Ω CT 3-4-5		
MMT8	50,000Ω CT 1-2-3	1200Ω CT 4-5-6		
MMT9	600Ω CT 1-2-3	1200Ω CT 4-5-6		
MMT10	25,000Ω 1-2	600Ω 3-4		

MICROTRAN COMPANY, INC.
145 EAST MINEOLA AVENUE
VALLEY STREAM, NEW YORK
516 LO 1-6050

TERMINAL ARRANGEMENTS

MICRO MINIATURE SERIES

Part No.	Connections		Terminal* Layout	Schematic**
	Pri. Imped.	Sec. Imped.		
MMT11	4000Ω CT 1-2-3	600Ω CT 4-5-6		
MMT12	2000Ω 1-2	3.4Ω 3-4		
MMT13	4000Ω CT 1-2-3	3.4Ω 4-5		
MMT16	10,000Ω 1-2	1,500Ω CT 3-4-5		
MMT17	10,000Ω CT 1-2-3	200Ω CT 4-5-6		
MMT18	25,000Ω CT 1-2-3	1,200Ω CT 4-5-6		
MMT19	2,500Ω 1-2	2,500Ω CT 3-4-5		
MMT21	4000Ω CT 1-2-3	600 SPLIT 150Ω 4-5 6-7		
MMT25	7500Ω CT 1-2-3	600Ω CT 4-5-6		
MMT26	600Ω CT 1-2-3	600Ω CT 4-5-6		
MMT27	25,000Ω CT 1-2-3	600Ω CT 4-5-6		
MMT28	10,000Ω CT 1-2-3	1500Ω CT 4-5-6		
MMT29	10,000Ω CT 1-2-3	10,000Ω CT 4-5-6		
MMT30	7,500Ω CT 1-2-3	1,200Ω CT 4-5-6		
MMT31	2,000Ω CT 1-2-3	500Ω CT 4-5-6		
MMT32	600Ω CT 1-2-3	1200Ω/300Ω SPLIT 4-5 & 6-7		

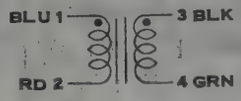
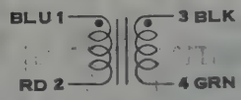
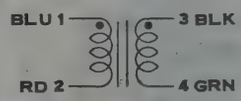
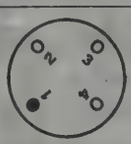
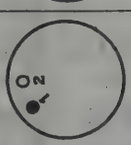
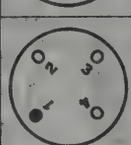
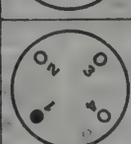
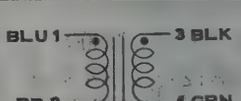
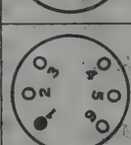
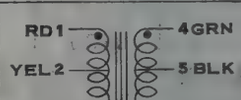
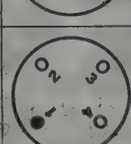
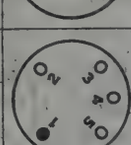
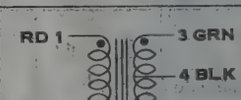
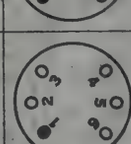
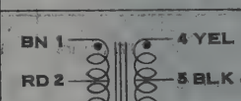
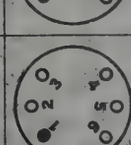
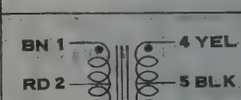
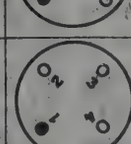
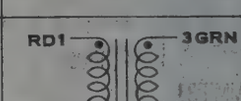
*NOTE: On hermetically sealed units only, Pin 1 may be marked by number or color. Numbers increase in clockwise direction.

**Terminal colors are only applicable to open frame units.

Terminal numbers apply to metal cased and molded units.

TERMINAL ARRANGEMENTS

MICRO MINIATURE SERIES

Part No.	Connections		Terminal* Layout	Schematic**
	Pri. Imped.	Sec. Imped.		
MM1	200Ω 50Ω 1-2	250,000Ω 62,000Ω 3-4		
MM2	10,000Ω 1-2	90,000Ω 3-4		
MM3	10,000Ω 1-2	200Ω 3-4		
MM4	30,000Ω 1-2	50Ω 3-4		
MM5	50 hy @ 1 MIL DC 1-2	4700Ω D.C. RES.		
MM6	100,000Ω 1-2	60Ω 3-4		
MM7	30,000Ω 1-2	1,200Ω 3-4		
MMT1	600Ω 1-2	600Ω 3-4		
MMT3	50,000Ω 1-2	600Ω 3-4		
MMT4	50,000Ω CT 1-2-3	600Ω CT 4-5-6		
MMT5	50,000Ω 1-2	6Ω 3-4		
MMT7	25,000Ω 1-2	1200Ω CT 3-4-5		
MMT8	50,000Ω CT 1-2-3	1200Ω CT 4-5-6		
MMT9	600Ω CT 1-2-3	1200Ω CT 4-5-6		
MMT10	25,000Ω 1-2	600Ω 3-4		

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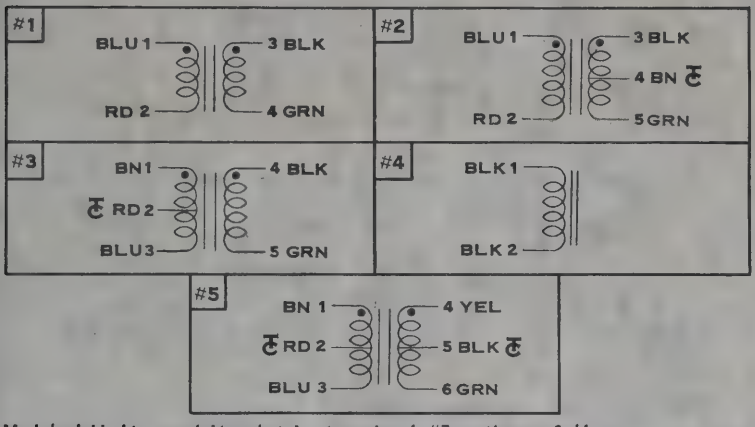
TERMINAL ARRANGEMENTS

ULTRA MINIATURE SERIES



Molded Units—white dot is terminal #1, others follow numerically in clockwise direction.

PART NO.	CONNECTIONS		SCHEMATIC NO
	Pri. Imped.	Sec. Imped.	
UM21	100K 1-2	1,000 3-4	1
UM22	20K 1-2	1,000 3-4	1
UM23	20K 1-2	1,200 C.T. 3-4-5	2
UM24	1,000 1-2	50 3-4	1
UM25	400 1-2	50 3-4	1
UM26	400 1-2	11 3-4	1
UM27	400 C.T. 1-2-3	11 4-5	3
UM28	10 HY ODC 1-2	8 HY 0.5 MA DC 1-2 600 DCR	4
UM29	600 C.T. 1-2-3	600 C.T. 4-5-6	5
UM30	1.5 HY ODC 1-2	0.7 HY 2 MA DC 100 DCR	4
UM31	10,000 C.T. 1-2-3	1,200 C.T. 4-5-6	5
UM32	1,500 C.T. 1-2-3	600 4-5	3
UM33	1,000 C.T. 1-2-3	600 4-5	3
UM34	10,000 C.T. 1-2-3	600 C.T. 4-5-6	5
UM35	15,000 C.T. 1-2-3	15,000 C.T. 4-5-6	5
UM36	20,000 C.T. 1-2-3	800 C.T. 4-5-6	5
UM37	10,000 1-2	2,000 C.T. 3-4-5	2
UM39	2,500 C.T. 1-2-3	600 C.T. 4-5-6	5

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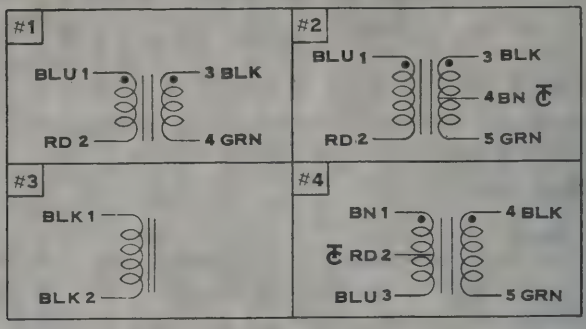
VERI-MINIATURE SERIES



Terminal colors are only applicable to open frame units.
Terminal numbers apply to cased and molded units.

PART NO.	CONNECTIONS		SCHEMATIC NO
	Pri. Imped.	Sec. Imped.	
VM1	50 1-2	600 3-4	1
VM2	200K 1-2	600 3-4	1
VM3	25K 1-2	600 3-4	1
VM4	200K 1-2	1,200 3-4	1
VM5	50K 1-2	600 3-4	1
VM6	100K 1-2	1,200 C.T. 3-4-5	2
VM7	500 1-2	3.4 3-4	1
VM8	1,250 1-2	3.4 3-4	1
VM9	1,250 1-2	50 3-4	1
VM10	2,500 1-2	2,500 C.T. 3-4-5	2
VM11	20 HY 0 DC 1-2	12 HY 0.5 MA DC 1000 DCR	3
VM12	20K 1-2	1,000 3-4	1
VM13	20K 1-2	1,000 C.T. 3-4-5	2
VM14	600 C.T. 1-2-3	600 C.T. 4-5-6	4
VM15	50,000 C.T. 1-2-3	50,000 C.T. 4-5-6	4
VM16	500 C.T. 1-2-3	250 C.T. 4-5-6	4
VM17	10,000 C.T. 1-2-3	5,000 C.T. 4-5-6	4

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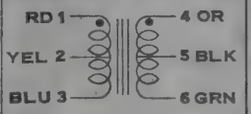
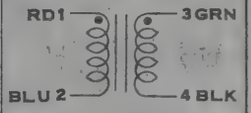
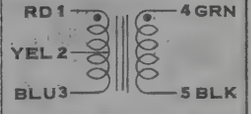
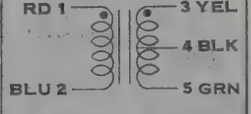
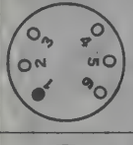
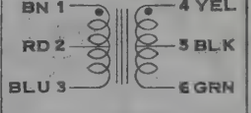
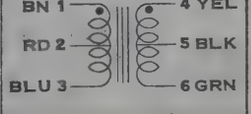
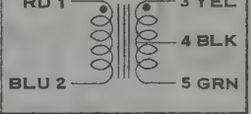
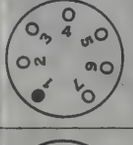
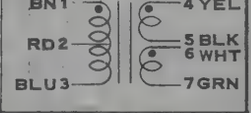
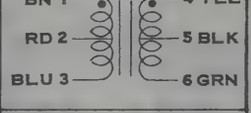
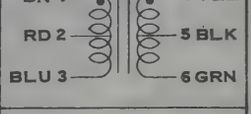
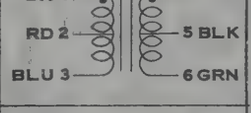
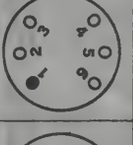
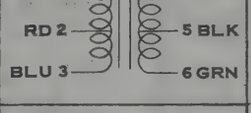
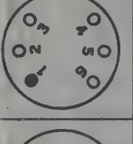
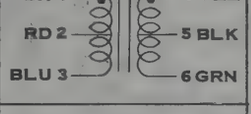
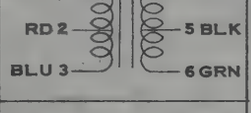
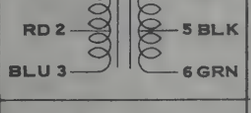
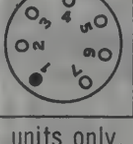
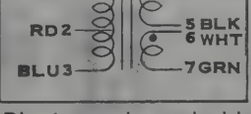
MICRO MINIATURE SERIES

Part No.	Connections		Terminal* Layout	Schematic**
	Pri. Imped.	Sec. Imped.		
MMT11	4000Ω CT 1-2-3	600Ω CT 4-5-6		
MMT12	2000Ω 1-2	3.4Ω 3-4		
MMT13	4000Ω CT 1-2-3	3.4Ω 4-5		
MMT16	10,000Ω 1-2	1,500Ω CT 3-4-5		
MMT17	10,000Ω CT 1-2-3	200Ω CT 4-5-6		
MMT18	25,000Ω CT 1-2-3	1,200Ω CT 4-5-6		
MMT19	2,500Ω 1-2	2,500Ω CT 3-4-5		
— MMT21	4000Ω CT 1-2-3	600 SPLIT 150Ω 4-5 6-7		
— MMT25	7500Ω CT 1-2-3	600Ω CT 4-5-6		
MMT26	600Ω CT 1-2-3	600Ω CT 4-5-6		
— MMT27	25,000Ω CT 1-2-3	600Ω CT 4-5-6		
MMT28	10,000Ω CT 1-2-3	1500Ω CT 4-5-6		
MMT29	10,000Ω CT 1-2-3	10,000Ω CT 4-5-6		
MMT30	7,500Ω CT 1-2-3	1,200Ω CT 4-5-6		
MMT31	2,000Ω CT 1-2-3	500Ω CT 4-5-6		
MMT32	600Ω CT 1-2-3	1200Ω/300Ω SPLIT 4-5 & 6-7		

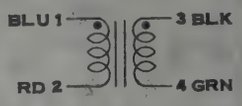
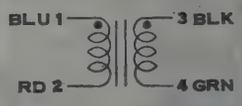
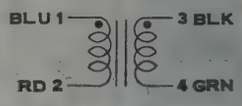
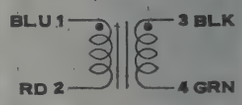
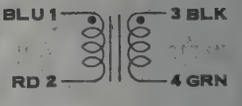
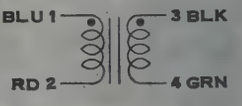
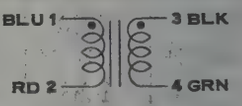
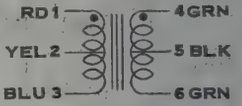
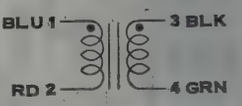
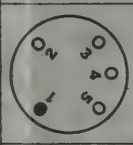
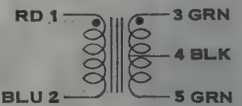
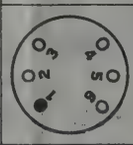
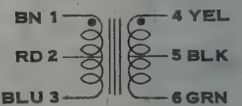
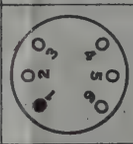
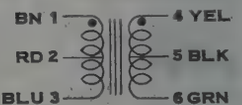
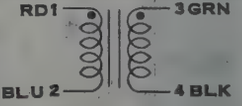
*NOTE: On hermetically sealed units only, Pin 1 may be marked by number or color. Numbers increase in clockwise direction.

**Terminal colors are only applicable to open frame units.

Terminal numbers apply to metal cased and molded units.

TERMINAL ARRANGEMENTS

MICRO MINIATURE SERIES

Part No.	Connections		Terminal* Layout	Schematic**
	Pri. Imped.	Sec. Imped.		
MM1	200Ω 50Ω 1-2	250,000Ω 62,000Ω 3-4		
MM2	10,000Ω 1-2	90,000Ω 3-4		
MM3	10,000Ω 1-2	200Ω 3-4		
MM4	30,000Ω 1-2	50Ω 3-4		
MM5	50 hy @ 1 MIL DC	4700Ω D.C. RES.		
MM6	100,000Ω 1-2	60Ω 3-4		
MM7	30,000Ω 1-2	1,200Ω 3-4		
MMT1	600Ω 1-2	600Ω 3-4		
MMT3	50,000Ω 1-2	600Ω 3-4		
MMT4	50,000Ω CT 1-2-3	600Ω CT 4-5-6		
MMT5	50,000Ω 1-2	6Ω 3-4		
MMT7	25,000Ω 1-2	1200Ω CT 3-4-5		
MMT8	50,000Ω CT 1-2-3	1200Ω CT 4-5-6		
MMT9	600Ω CT 1-2-3	1200Ω CT 4-5-6		
MMT10	25,000Ω 1-2	600Ω 3-4		

MICROTRAN COMPANY, INC.
145 EAST MINEOLA AVENUE
VALLEY STREAM, NEW YORK
516 LO 1-6050

POWERSTAT® VARIABLE TRANSFORMER INSTRUCTIONS

10B, 10B-40 AND 12 SERIES

Covered by one or more of the following U.S. Patents: 2,947,959; 3,087,132; 3,128,442; 3,136,967. Patented Canada 1963.

INSPECTION

Your new POWERSTAT Variable Transformer has been carefully packed for shipment. However, damage may occur in transit. After receiving unit, check all components (brush contact primarily) to satisfy yourself that there is no damage. Also make sure that the dial, knob, lockwasher and mounting nuts are in the package. The "Damage and Shortage" Instructions packed with the unit outline the proper procedure to follow if any parts are damaged or missing.

INSTALLATION

POWERSTAT Variable Transformers of the 10B, 10B-40 and 12 Series are designed for mounting in the back-of-panel position only.

SINGLE UNITS

The single hole mounting of single units is fast and simple. For keying to the panel, a 1/16 inch projection is provided. To facilitate mounting, a drilling template is supplied as part of these instructions. Actually, the drilling template must be used only when the hole for the 1/16 inch projection is required.

To mount, proceed as follows:

1. Using the drilling template, locate the panel holes. In order that the terminals should be on top, the template should be upright. Drill the holes.
2. Mount the POWERSTAT variable transformer as shown. Mount the unit flush to the back of the panel and the dial flush to the front. A single nut and lockwasher hold the unit and dial in place. The knob, mounted on the shaft, covers the nut and lockwasher.
3. If the unit is not to be keyed to the panel, only the hole for the 3/8 inch center shaft should be drilled. The extra nut provided is placed on the shaft between the unit and the back of the panel. Otherwise the mounting is as explained above.

GANGED UNITS

Ganged units require four panel holes for mounting. Three are needed for the mounting bolts and a clearance hole is necessary for the center shaft.

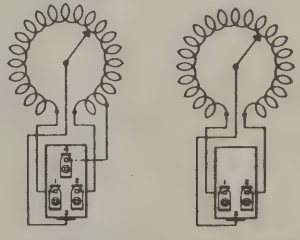
To mount, proceed as follows:

1. Using the drilling template locate the four panel holes. If the template is upright, the terminals will not be directly on top. When terminals are required at the top, line marked "T" should be vertical. Drill the holes.
2. Mount the unit behind the panel as shown using the three 1/4" 20 mounting bolts provided. Mount the dial on the front of the panel, securing it in place with the 3/8"-32 nut and lockwasher provided. The knob, when mounted on the shaft covers the nut and lockwasher.

CONNECTION AND RATING

POWERSTAT Variable Transformers of the 10B, 10B-40 and 12 Series may be connected to suit various requirements as shown in the chart. The individual units in types 10B-40-2 and 10B-40-3 are not electrically interconnected but are independently wired following the type 10B-40 connections. Under "KNOB ROTATION," rotating the knob in the direction indicated will INCREASE the output voltage. The dial is marked for clockwise rotation only.

VIEWED FROM PANEL END



TYPES 10B, 12 TYPE 10B-40

TYPE	INPUT VOLTAGE	FREQUENCY (hertz)	OUTPUT					KNOB ROTATION	TERMINALS		
			VOLTS	CONSTANT CURRENT LOAD		CONSTANT IMPEDANCE LOAD			INPUT	JUMPER*	OUTPUT
				MAX. AMP.	MAX. KVA	MAX. AMP.	MAX. KVA				
SINGLE UNITS — SINGLE PHASE											
10B-40	40	60	0-40	7	0.28	9	0.36	CW	1-2		1-3
								CCW	1-2		2-3
10B	120	50/60	0-120	2.25†	0.27	3‡	0.36	CW	1-2		1-3
								CCW	1-2		2-3
		60	0-132	2.25†	0.30			CW	1-4		1-3
12	240	50/60	0-240	0.7††	0.17	0.9**	0.22	CW	1-2		1-3
								CCW	1-2		2-3
			0-264	0.5‡‡	0.13			CW	1-4		1-3
TWO GANG ASSEMBLIES — SINGLE PHASE, SERIES CONNECTED											
10B-2	240	50/60	0-240	2.25†	0.54	3‡	0.72	CW	2-2	1-1	3-3
								CCW	1-1	2-2	3-3
		60	0-264	2.25†	0.59			CW	4-4	1-1	3-3
12-2	480	50/60	0-480	0.7††	0.34	0.9**	0.43	CW	2-2	1-1	3-3
								CCW	1-1	2-2	3-3
			0-528	0.5‡‡	0.26			CW	4-4	1-1	3-3
TWO GANG ASSEMBLIES — THREE PHASE, OPEN DELTA CONNECTED											
10B-2	120	50/60	0-120	2.25†	0.47	3‡	0.62	CW	2-1-2	1-1	3-1-3
								CCW	1-2-1	2-2	3-2-3
		60	0-132	2.25†	0.51			CW	4-1-4	1-1	3-1-3
12-2	240	50/60	0-240	0.7††	0.29	0.9**	0.37	CW	2-1-2	1-1	3-1-3
								CCW	1-2-1	2-2	3-2-3
			0-264	0.5‡‡	0.23			CW	4-1-4	1-1	3-1-3
THREE GANG ASSEMBLIES — THREE PHASE, WYE CONNECTED											
10B-3	240	60	0-240	2.25†	0.94	3‡	1.2	CW	2-2-2	1-1-1	3-3-3
								CCW	1-1-1	2-2-2	3-3-3
12-3	480	50/60	0-480	0.7††	0.58	0.9**	0.75	CW	2-2-2	1-1-1	3-3-3
								CCW	1-1-1	2-2-2	3-3-3
		60	0-528	0.5‡‡	0.46			CW	4-4-4	1-1-1	3-3-3

*Jumper provided in standard common position should be moved or removed as required.
†Rating when mounted on a metal panel. When mounted on a bracket or nonmetallic panel, derate to 1.75 amperes.
‡Rating when mounted on a metal panel. When mounted on a bracket or nonmetallic panel, derate to 2.5 amperes.
††Rating when mounted on a metal panel. When mounted on a bracket or nonmetallic panel, derate to 0.5 ampere.
**Rating when mounted on a metal panel. When mounted on a bracket or nonmetallic panel, derate to 0.75 ampere.
‡‡0.7 ampere maximum in range from zero to line voltage when mounted on a metal panel.

PRECAUTIONS

Be absolutely certain that the line voltage, phase and frequency are as noted on the nameplate. Install a fuse in the brush output lead.

MAINTENANCE

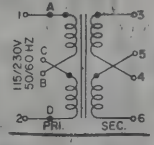
With ordinary care and attention to the precautions outlined above, the POWERSTAT Variable Transformer should require no servicing except possible replacement of the brush. The brush should be inspected periodically and replaced if arcing takes place or if it is badly worn. The correct replacement brush is RB10B for 10B Series units, RB10B-40 for 10B-40 Series units and RB12 for 12 Series units. Because the brushes must be of a special material, only the specified replacement should be used.

Whenever electrical or mechanical difficulties arise in installing or operating the POWERSTAT Variable Transformer, contact the factory or the nearest Superior Electric field office.

115/230 Volts 50/60 Hz.
DUAL PRIMARY
PLUG-IN PRINTED CIRCUIT
POWER TRANSFORMERS

CONSTRUCTED PER MIL-T-27, GRADE 6–CLASS R

Primary:
Connect to Pins 1 & 2
For 230v – Join B to C
For 115v – Join A to C, & B to D



Secondary:
Connect to Pins 3 & 6
For Parallel Output – Join 3 to 5, & 4 to 6
For Series Output – Join 4 to 5

NOTE:
All Transformers are connected as per schematic except for part numbers noted below.

EXCEPTIONS

PART NO.	RATING	CONNECT TO
PC2506	6.3V C.T. @ .25A	3 – 4 C.T. – 5
PC2632	115V @ .02A 12.6V @ .15A	3 & 4 5 & 6
PC2732	115V @ .025A 12.6V @ .25A	3 & 4 5 & 6

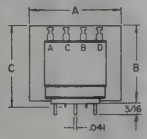


FIG. A

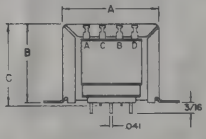
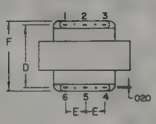
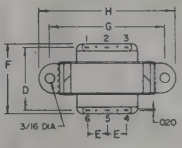


FIG. B





CATALOG NO.	SECONDARY	
	PARALLEL	SERIES
SERIES PC 2500 — 50/60 Hz • 115/230V. Pri. • Approx. 1½ V.A. • 3.2 oz.		
PC2506	6.3V C.T. @ .250A (Single Secondary)	
PC2512	12.6V @ .120A	25.2V C.T. @ .060A
PC2524	40V @ .040A	80V C.T. @ .020A
PC2528	58V @ .026A	116V C.T. @ .013A
SERIES PC 2600 — 50/60 Hz • 115/230V. Pri. • Approx. 4½ V.A. • 6.5 oz.		
PC2608	6.3V @ .70A	12.6V C.T. @ .35A
PC2616	28V @ .156A	56V C.T. @ .078A
PC2624	40V @ .110A	80V C.T. @ .055A
PC2628	58V @ .066A	116V C.T. @ .033A
PC2632	115V @ .020A, 12.6V @ .150A	
SERIES PC 2700 — 50/60 Hz • 115/230V. Pri. • Approx. 7½ V.A. • 9.5 oz.		
PC2708	6.3V @ 1.2A	12.6V C.T. @ .60A
PC2712	12.6V @ .6A	25.2V C.T. @ .30A
PC2715	20V @ .38A	40V C.T. @ .190A
PC2716	28V @ .27A	56V C.T. @ .135A
PC2724	40V @ .18A	80V C.T. @ .090A
PC2728	58V @ .130A	116V C.T. @ .065A
PC2732	115V @ .025A, 12.6V @ .250A	

DIMENSIONS

SERIES	FIG.	A	B	C	D	E	F	G	H
PC2500	A	1 25/64	1 11/64	1 13/64	1.00	.312	1 5/32		
PC2600	B	1 45/64	1 25/64	1 7/16	1.10	.400	1¼	2	2⅜
PC2700	B	1 61/64	1 41/64	1 11/16	1.30	.400	1 15/32	2⅜	2 13/16

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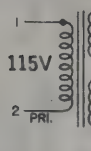
PLUG-IN PRINTED CIRCUIT POWER TRANSFORMERS

CONSTRUCTED PER MIL-T-27 GRADE 6–CLASS R



Secondary:
Connect to Pins 3 & 6
For Parallel Output – Join 3 to 5, & 4 to 6
For Series Output – Join 4 to 5

NOTE:
All Transformers are connected as per schematic except for part numbers noted below.

EXCEPTIONS

PART NO.	RATING	CONNECT TO
PC 4432	115V @ .01A 12.6V @ .15A	3 & 4 5 & 6
PC 6506	6.3V C.T. @ .25A	3 – 4 C.T. – 5
PC 6632	115V @ .02A 12.6V @ .15A	3 & 4 5 & 6
PC 6732	115V @ .025A 12.6V @ .25A	3 & 4 5 & 6

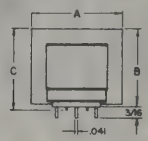


FIG. A

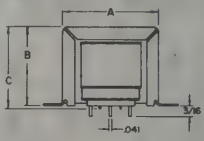
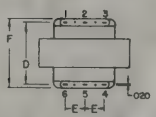
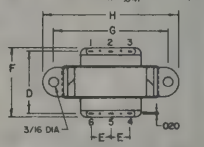


FIG. B





CATALOG NO.	SECONDARY	
	PARALLEL	SERIES
SERIES PC 4300 – 400 Hz • Approx. .325 Watts • .5 oz.		
PC4304	3.15V @ .1A	6.3V C.T. @ .05A
PC4312	12.6V @ .026A	25.2V C.T. @ .013A
PC4316	28V @ .012A	56V C.T. @ .006A
PC4320	35V @ .01A	70V C.T. @ .005A
SERIES PC 4400 – 400 Hz • Approx. 4 Watts • 1.2 oz.		
PC4408	6.3V @ 0.60A	12.6V C.T. @ .30A
PC4412	12.6V @ 0.30A	25.2V C.T. @ .15A
PC4416	28V @ 0.14A	56V C.T. @ .07A
PC4424	40V @ 0.10A	80V C.T. @ .05A
PC4428	58V @ .066A	116V C.T. @ .033A
PC4432	115V @ .010A, 12.6V @ .150A	
SERIES PC 6500 – 50/60 Hz • Approx. 1½ Watts • 3.2 oz.		
PC6506	6.3V C.T. @ .250A (Single Secondary)	
PC6512	12.6V @ .120A	25.2V C.T. @ .060A
PC6524	40V @ .040A	80V C.T. @ .020A
PC6528	58V @ .026A	116V C.T. @ .013A
SERIES PC 6600 – 50/60 Hz • Approx. 4½ Watts • 6.5 oz.		
PC6608	6.32V @ .70A	12.6V C.T. @ .35A
PC6616	28V @ .156A	56V C.T. @ .078A
PC6624	40V @ .110A	80V C.T. @ .055A
PC6628	58V @ .066A	116V C.T. @ .033A
PC6632	115V @ .020A, 12.6V @ .150A	
SERIES PC 6700 – 50/60 Hz • Approx. 7½ Watts • 9.5 oz.		
PC6708	6.3V @ 1.2A	12.6V C.T. @ .60A
PC6712	12.6V @ .6A	25.2V C.T. @ .30A
PC6715	20V @ .38A	40V C.T. @ .190A
PC6716	28V @ .27A	56V C.T. @ .135A
PC6724	40V @ .18A	80V C.T. @ .090A
PC6728	58V @ .130A	116V C.T. @ .065A
PC6732	115V @ .025A, 12.6V @ .250A	

DIMENSIONS

SERIES	FIG.	A	B	C	D	E	F	G	H
PC4300	A	49/64	23/32	†	.420	.187	11/16		
PC4400	A	1 1/64	27/32	†	.781	.200	51/64		
PC6500	A	1 25/64	1 11/64	1 13/64	1.00	.312	1 3/32		
PC6600	B	1 45/64	1 25/64	1 7/16	1.10	.400	1 1/4	2	2 3/8
PC6700	B	1 61/64	1 41/64	1 1/16	1.30	.400	1 15/32	2 3/8	2 13/16

† Do not have standoff

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STANCOR

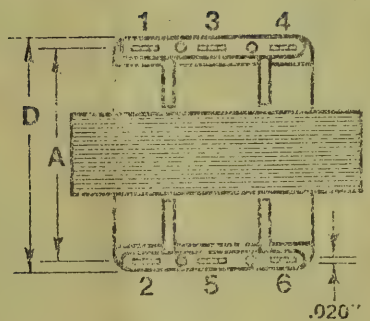
ESSEX INTERNATIONAL, INC.
SUBSIDIARY OF UNITED AIRCRAFT CORPORATION
CONTROLS DIVISION
3501 W. ADDISON ST., CHICAGO, ILL. 60618

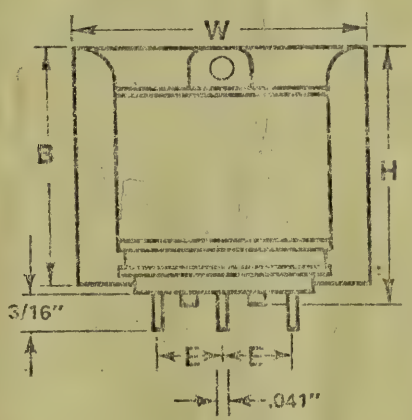
Part No. PPC-1 THRU PPC-25
Type POWER TRANSFORMERS
Date 10-74
S.D.S. No. 6-1073

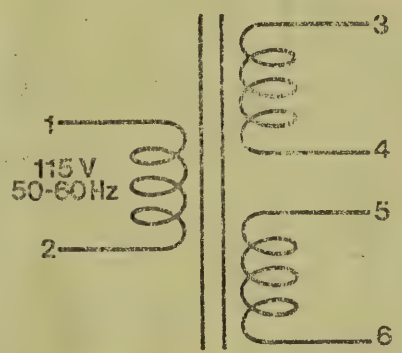
☐ SERVICE DATA SHEET

MINIATURE POWER TRANSFORMERS

- For Printed Circuit Board Mountings with Molded-In Plug-In Type Terminals.
- All with Single Primary: 115 Volt, 50-60 Hz. Input.
- Hi-Pot Test: 500 Volts RMS between all Windings and to Core.
- Class "A" Insulation, 105°C. Maximum Operating Temperature Limit.







DIMENSIONS
All Tolerances on Dimensions are ± 1/32" except A = ±1/16"

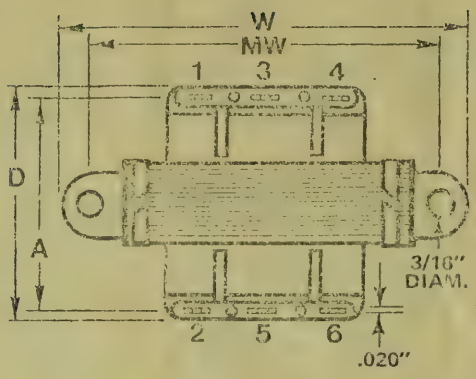
H = 1 3/16"
W = 1 3/8"
D = 1 1/8"
A = 1.0"
B = 1 1/8"
E = 5/16"

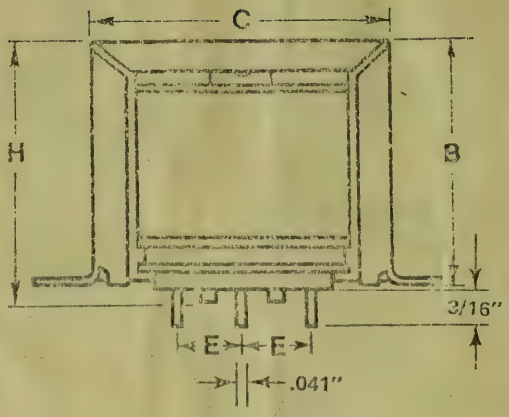
PARALLEL
Connect 3 & 5, 4 & 6
Use 3 & 4
or
SERIES
Connect 4 & 5
Use 3 & 6

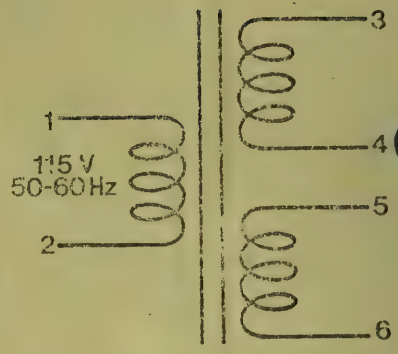
F 131P

STANCOR Part No.	STYLE	VA Cap.	OUTPUT FROM TWO SECONDARY WINDINGS			WT. Lbs.
			INDIVIDUALLY	PARALLEL	SERIES	
PPC-1	PC	1.5	4 V @ .188 A	4 V @ .376 A	8 V CT @ .188 A	.22
PPC-2	PC	1.5	7.5 V @ .100 A	7.5 V @ .200 A	15 V CT @ .100 A	.22
PPC-3	PC	1.5	15 V @ .050 A	15 V @ .100 A	30 V CT @ .050 A	.22
PPC-4	PC	1.5	27 V @ .028 A	27 V @ .056 A	54 V CT @ .028 A	.22
PPC-5	PC	1.5	38 V @ .020 A	38 V @ .040 A	76 V CT @ .020 A	.22

(OVER)







DIMENSIONS

All Tolerances on Dimensions are ± 1/32" except A = ± 1/16"; W = ± 1/16"; and MW = ± 1/16".

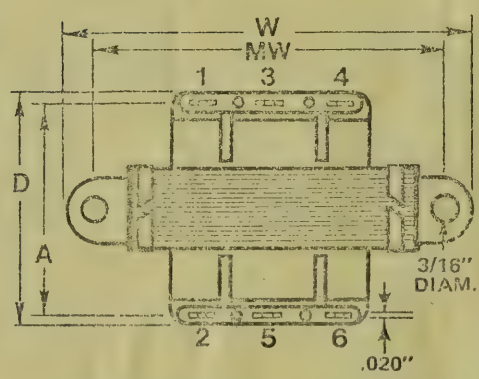
H = 1 7/16" A = 1.1"
W = 2 3/8" B = 1 3/8"
D = 1 1/4" C = 1 23/32"
MW = 2" E = 0.4"

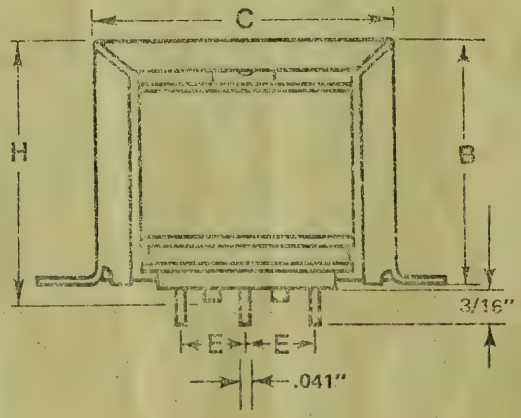
PARALLEL
Connect 3 & 5, 4 & 6
Use 3 & 4

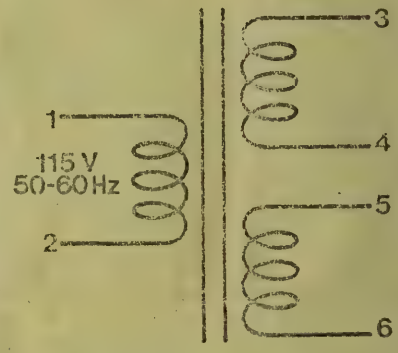
or

SERIES
Connect 4 & 5
Use 3 & 6

STANCOR Part No.	STYLE	VA Cap.	OUTPUT FROM TWO SECONDARY WINDINGS			WT. Lbs.
			INDIVIDUALLY	PARALLEL	SERIES	
PPC-11	APC	4.5	4 V @ .562 A	4 V @ 1.13 A	8 V CT @ .562 A	.47
PPC-12	APC	4.5	7.5 V @ .300 A	7.5 V @ .600 A	15 V CT @ .300 A	.47
PPC-13	APC	4.5	15 V @ .150 A	15 V @ .300 A	30 V CT @ .150 A	.47
PPC-14	APC	4.5	27 V @ .084 A	27 V @ .168 A	54 V CT @ .084 A	.47
PPC-15	APC	4.5	38 V @ .060 A	38 V @ .120 A	76 V CT @ .060 A	.47







DIMENSIONS

All Tolerances on Dimensions are ± 1/32" except A = ± 1/16"; W = ± 1/16"; and MW = ± 1/16".

H = 1 11/16" A = 1.3"
W = 2 13/16" B = 1 5/8"
D = 1 7/16" C = 1 31/32"
MW = 2 3/8" E = 0.4"

PARALLEL
Connect 3 & 5, 4 & 6
Use 3 & 4

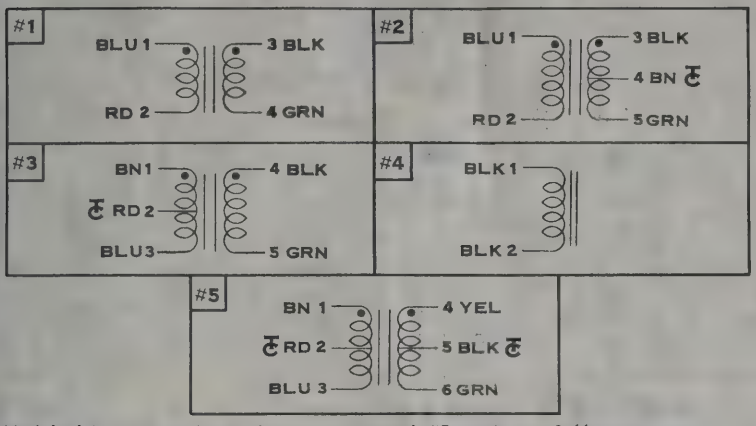
or

SERIES
Connect 4 & 5
Use 3 & 6

STANCOR Part No.	STYLE	VA Cap.	OUTPUT FROM TWO SECONDARY WINDINGS			WT Lbs.
			INDIVIDUALLY	PARALLEL	SERIES	
PPC-21	APC	7.5	4 V @ .940 A	4 V @ 1.88 A	8 V CT @ .040 A	.66
PPC-22	APC	7.5	7.5 V @ .500 A	7.5 V @ 1.00 A	15 V CT @ .500 A	.66
PPC-23	APC	7.5	15 V @ .250 A	15 V @ .500 A	30 V CT @ .250 A	.66
PPC-24	APC	7.5	27 V @ .140 A	27 V @ .280 A	54 V CT @ .140 A	.66
PPC-25	APC	7.5	38 V @ .100 A	38 V @ .200 A	76 V CT @ .100 A	.66

TERMINAL ARRANGEMENTS

ULTRA MINIATURE SERIES



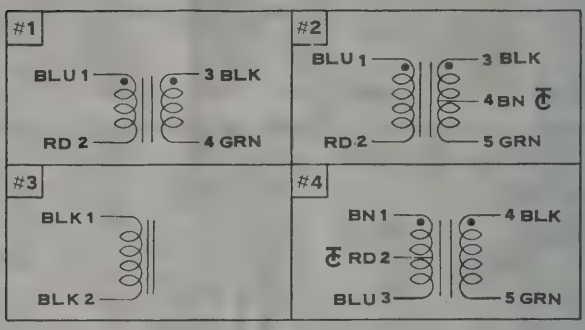
Molded Units—white dot is terminal #1, others follow numerically in clockwise direction.

PART NO.	CONNECTIONS		SCHEMATIC NO
	Pri. Imped.	Sec. Imped.	
UM21	100K 1-2	1,000 3-4	1
UM22	20K 1-2	1,000 3-4	1
UM23	20K 1-2	1,200 C.T. 3-4-5	2
UM24	1,000 1-2	50 3-4	1
UM25	400 1-2	50 3-4	1
UM26	400 1-2	11 3-4	1
UM27	400 C.T. 1-2-3	11 4-5	3
UM28	10 HY ODC 1-2	8 HY 0.5 MA DC 1-2 600 DCR	4
UM29	600 C.T. 1-2-3	600 C.T. 4-5-6	5
UM30	1.5 HY ODC 1-2	0.7 HY 2 MA DC 100 DCR	4
UM31	10,000 C.T. 1-2-3	1,200 C.T. 4-5-6	5
UM32	1,500 C.T. 1-2-3	600 4-5	3
UM33	1,000 C.T. 1-2-3	600 4-5	3
UM34	10,000 C.T. 1-2-3	600 C.T. 4-5-6	5
UM35	15,000 C.T. 1-2-3	15,000 C.T. 4-5-6	5
UM36	20,000 C.T. 1-2-3	800 C.T. 4-5-6	5
UM37	10,000 1-2	2,000 C.T. 3-4-5	2
UM39	2,500 C.T. 1-2-3	600 C.T. 4-5-6	5

MICROTRAN COMPANY, INC.
145 EAST MINEOLA AVENUE
VALLEY STREAM, NEW YORK
516 LO 1-6050

TERMINAL ARRANGEMENTS

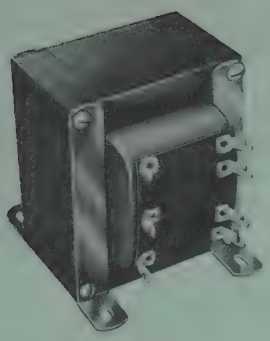
VERI-MINIATURE SERIES



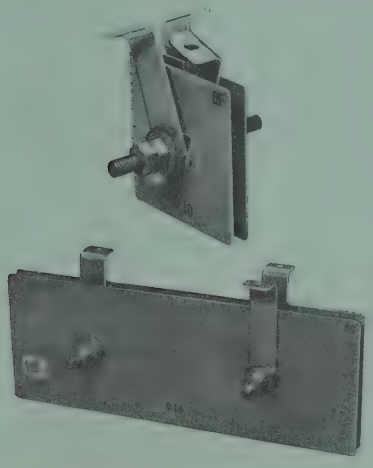
Terminal colors are only applicable to open frame units.
Terminal numbers apply to cased and molded units.

PART NO.	CONNECTIONS		SCHEMATIC NO
	Pri. Imped.	Sec. Imped.	
VM1	50 1-2	600 3-4	1
VM2	200K 1-2	600 3-4	1
VM3	25K 1-2	600 3-4	1
VM4	200K 1-2	1,200 3-4	1
VM5	50K 1-2	600 3-4	1
VM6	100K 1-2	1,200 C.T. 3-4-5	2
VM7	500 1-2	3.4 3-4	1
VM8	1,250 1-2	3.4 3-4	1
VM9	1,250 1-2	50 3-4	1
VM10	2,500 1-2	2,500 C.T. 3-4-5	2
VM11	20 HY 0 DC 1-2	12 HY 0.5 MA DC 1000 DCR	3
VM12	20K 1-2	1,000 3-4	1
VM13	20K 1-2	1,000 C.T. 3-4-5	2
VM14	600 C.T. 1-2-3	600 C.T. 4-5-6	4
VM15	50,000 C.T. 1-2-3	50,000 C.T. 4-5-6	4
VM16	500 C.T. 1-2-3	250 C.T. 4-5-6	4
VM17	10,000 C.T. 1-2-3	5,000 C.T. 4-5-6	4

MICROTRAN COMPANY, INC.
145 EAST MINEOLA AVENUE
VALLEY STREAM, NEW YORK
516 LO 1-6050



Tarzian / STANCOR



Each transformer has the winding arrangement and terminal numbering shown in the schematic diagrams above.

The primary winding is connected to terminals 1, 2, 3 & 4. A separate winding is connected to terminals 5, 6 & 7 that may be used in series with the primary to raise or lower the secondary voltage output. A variety of combinations is possible using the taps on both windings, plus the "Aiding" or "Bucking" action of the extra winding.

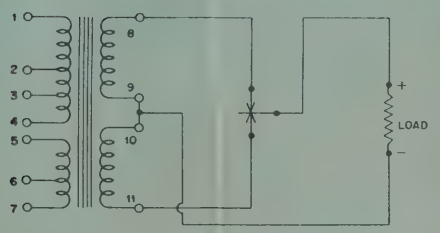
Designed for 117 V. 50/60 cycle operation; may also be satisfactorily operated at 400 cycles.

The secondary winding of each transformer consists of two identical windings connected to terminals 8 & 9 and to 10 & 11 respectively. Use the tables showing the various output voltages for specific terminal connections as your guide. Many combinations are possible other than those listed in the tables.

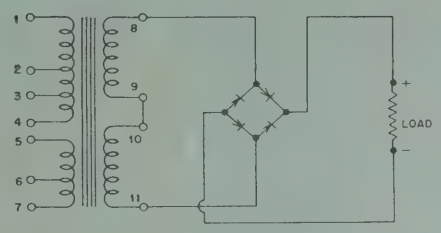
All ratings shown are for normal convection air cooled applications. Select only rectifiers capable of handling the output voltages and currents described

Common schematics for the complete RT series

FULL-WAVE C. T.



FULL-WAVE BRIDGE



RT-206 — Full-Wave C. T. / Full-Wave Bridge

Use with Sarkes-Tarzian Selenium Rectifier Part Nos. **D-14** (Output 12.0 A. D.C.) / **D-19** (Output 6.0 A. D.C.)

Stancor Power Supply Input 117vac Term. No.	Connect Term. No.	D-14 Resistive Load Secondary Volts AC	D-14 Resistive Load Output Volts DC	D-14 Capacitive Load* Secondary Volts AC	D-14 Capacitive Load* Output Volts DC	D-19 Resistive Load Secondary Volts AC	D-19 Resistive Load Output Volts DC	D-19 Capacitive Load** Secondary Volts AC	D-19 Capacitive Load** Output Volts DC
1-2	---	29.8	11.5	29.6	14.4	29.6	24.0	29.2	32.0
1-7	2-6	26.0	9.9	25.8	12.0	25.8	20.6	25.4	27.3
1-6	2-5	23.8	8.8	23.6	10.7	23.8	18.6	23.6	24.6
1-7	2-5	21.2	7.6	21.0	9.0	21.2	16.4	21.0	21.4
1-3	---	19.7	7.0	19.7	8.4	19.7	15.2	19.4	19.2
1-7	3-6	17.9	6.2	17.8	7.2	17.9	13.5	17.8	17.3
1-6	3-5	16.7	5.7	16.6	6.6	16.8	12.5	16.6	15.8
1-7	3-5	15.4	5.1	15.4	5.9	15.4	11.4	15.2	14.0
1-4	---	14.6	4.7	14.5	5.2	14.6	10.6	14.5	13.4
1-7	4-6	13.5	4.2	13.4	4.7	13.5	9.8	13.4	12.0
1-6	4-5	12.9	3.9	12.8	4.3	12.9	9.2	12.8	11.0
1-7	4-5	12.0	8.4	12.0	3.9	12.0	8.4	12.0	10.0

*6000 MFD. **3000 MFD.

RT-208 — Full-Wave C. T. / Full-Wave Bridge

Use with Sarkes-Tarzian Selenium Rectifier Part Nos. **D-15** (Output 15.0 A. D.C.) / **D-20** (Output 8.0 A. D.C.)

Stancor Power Supply Input 117vac Term No.	Connect Term No.	D-15 Resistive Load Secondary Volts AC	D-15 Resistive Load Output Volts DC	D-15 Capacitive Load* Secondary Volts AC	D-15 Capacitive Load* Output Volts DC	D-20 Resistive Load Secondary Volts AC	D-20 Resistive Load Output Volts DC	D-20 Capacitive Load** Secondary Volts AC	D-20 Capacitive Load** Output Volts DC
1-2	---	29.2	11.4	29.2	14.8	29.2	23.7	29.0	32.5
1-7	2-6	25.4	9.9	25.4	12.5	25.3	21.0	25.2	27.0
1-6	2-5	24.1	9.3	24.0	11.6	24.0	19.4	23.9	25.5
1-7	2-5	21.5	8.2	21.5	10.0	21.3	17.0	21.3	22.0
1-3	---	19.3	7.1	19.3	8.7	19.1	14.9	19.1	21.2
1-7	3-6	17.6	6.4	17.5	7.7	17.4	13.4	17.4	17.0
1-6	3-5	16.8	6.0	16.8	7.2	16.8	12.9	16.7	16.1
1-7	3-5	15.6	5.5	15.5	6.5	15.4	11.7	15.4	14.5
1-4	---	14.4	5.0	14.4	5.7	14.2	10.7	14.2	13.1
1-7	4-6	13.4	4.5	13.4	5.1	13.3	9.8	13.3	11.9
1-6	4-5	13.0	4.3	12.9	4.8	12.9	9.5	12.8	11.4
1-7	4-5	12.2	3.9	12.1	4.4	12.1	8.7	12.1	10.4

*7500 MFD. **4000 MFD.

RT-2012 — Full-Wave C. T. / Full-Wave Bridge

Use with Sarkes-Tarzian Selenium Rectifier Part Nos. **D-16** (Output 22.5 A. D.C.) / **D-21** (Output 12.0 A. D.C.)

Stancor Power Supply Input 117vac Term. No.	Connect Term. No.	D-16 Resistive Load Secondary Volts AC	D-16 Resistive Load Output Volts DC	D-16 Capacitive Load* Secondary Volts AC	D-16 Capacitive Load* Output Volts DC	D-21 Resistive Load Secondary Volts AC	D-21 Resistive Load Output Volts DC	D-21 Capacitive Load** Secondary Volts AC	D-21 Capacitive Load** Output Volts DC
1-2	---	29.1	11.4	28.8	14.3	29.0	23.5	28.7	33.0
1-7	2-6	25.2	9.7	25.1	12.0	25.3	20.4	25.1	28.0
1-6	2-5	23.6	8.9	23.6	10.9	23.5	18.8	23.5	25.7
1-7	2-5	21.1	7.7	21.0	9.4	21.0	16.3	20.9	22.3
1-3	---	19.3	7.2	19.3	8.3	19.2	14.8	19.2	20.2
1-7	3-6	17.7	6.3	17.7	7.2	17.5	13.4	17.5	17.7
1-6	3-5	16.9	6.0	16.9	6.7	16.8	12.5	16.8	16.7
1-7	3-5	15.6	5.4	15.7	5.9	15.5	11.5	15.5	15.1
1-4	---	14.6	4.9	14.6	5.4	14.5	10.7	14.5	13.7
1-7	4-6	13.5	4.4	13.5	4.7	13.5	9.7	13.4	12.6
1-6	4-5	13.0	4.3	13.0	4.5	13.0	9.3	13.0	11.9
1-7	4-5	12.2	3.9	12.1	4.0	12.2	8.6	12.0	10.8

*11,250 MFD. **6000 MFD.

RT-408 FULL-WAVE BRIDGE / RT-4012 FULL-WAVE BRIDGE

Use with Sarkes-Tarzian Selenium Rectifier Part Nos. **D-27** (Output 8.0 A. D.C.) / **D-28** (Output 12.0 A. D.C.)

Stancor Power Supply Input 117vac Term. No.	Connect Term. No.	D-27 Resistive Load Secondary Volts AC	D-27 Resistive Load Output Volts DC	D-27 Capacitive Load* Secondary Volts AC	D-27 Capacitive Load* Output Volts DC	D-28 Resistive Load Secondary Volts AC	D-28 Resistive Load Output Volts DC	D-28 Capacitive Load** Secondary Volts AC	D-28 Capacitive Load** Output Volts DC
1-2	---	53.5	44.0	53.0	63.0	53.0	43.5	53.0	60.0
1-7	2-6	50.0	40.5	50.0	59.0	49.5	40.0	49.0	55.0
1-6	2-5	45.3	37.0	45.0	52.0	43.5	34.0	43.0	48.0
1-7	2-5	42.5	34.5	42.0	48.0	41.5	32.0	41.0	45.5
1-3	---	37.5	30.5	37.5	40.0	37.5	29.0	37.0	40.0
1-7	3-6	35.5	27.5	35.5	39.0	35.5	27.0	35.0	37.5
1-6	3-5	32.5	25.0	33.0	35.5	32.8	24.0	32.7	34.0
1-7	3-5	31.5	24.0	31.5	31.5	31.0	23.0	30.8	31.0
1-4	---	29.0	21.5	29.0	29.5	29.0	21.2	29.0	29.0
1-7	4-6	27.5	20.5	27.5	28.0	27.8	20.0	28.0	28.0
1-6	4-5	26.0	19.5	26.0	26.0	26.0	19.0	26.0	25.0
1-7	4-5	25.0	18.0	25.0	25.0	25.0	18.0	25.0	24.0

*4000 MFD. **6000 MFD.

SARKES-TARZIAN RECTIFIER DIVISION
415 North College Avenue, Bloomington, Indiana

STANCOR ELECTRONICS INC.
3501 West Addison Street, Chicago 18, Illinois

Bulletin 518-R

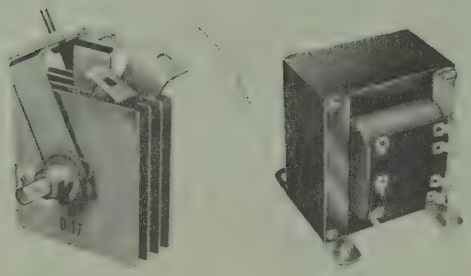
8 STANCOR Power Supply

Transformers for use with Sarkes-Tarzian Stock Selenium Rectifiers

All of these transformers will operate in Full-Wave Center-Tapped or Bridge Type Circuits with readily available stock sizes of Selenium Rectifiers

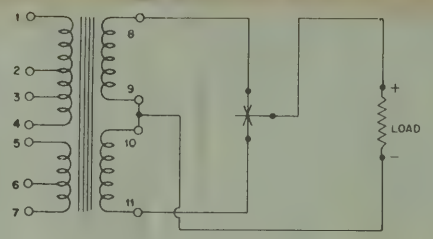
STANCOR Part No.	Sarkes-Tarzian Part No.
RT-201	D-10 / D-52
RT-202	D-11 / D-17
RT-204	D-13 / D-18
RT-206	D-14 / D-19
RT-208	D-15 / D-20
RT-408	D-16 / D-21
RT-2012	D-27
RT-4012	D-28

Tarzian / STANCOR

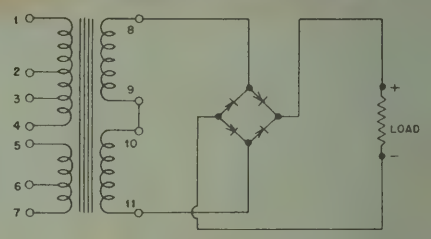


Common schematics for the complete RT series

FULL-WAVE C. T.



FULL-WAVE BRIDGE



RT-201

Stancor Power Supply		Full-Wave C. T.				Full-Wave Bridge			
		Use with Sarkes-Tarzian Selenium Rectifier Part Nos. D-10				D-52			
		Output 2.0 A. D.C.				Output 1.25 A. D.C.			
		Resistive Load		Capacitive Load		Resistive Load		Capacitive Load	
Input 117vac Term. No.	Connect Term. No.	Secondary Volts AC	Output Volts DC	Secondary Volts AC	Output Volts DC	Secondary Volts AC	Output Volts DC	Secondary Volts AC	Output Volts DC
1-2	---	29.4	11.2	28.8	11.8	28.5	23.0	27.9	30.0
1-7	2-6	26.0	9.8	25.7	11.7	25.4	20.0	25.1	26.4
1-6	2-5	23.0	8.4	22.7	9.9	22.3	17.3	21.8	22.2
1-7	2-5	20.9	7.4	20.8	8.6	20.2	15.4	19.8	19.7
1-3	---	19.4	6.7	19.1	7.6	18.6	13.9	18.2	17.6
1-7	3-6	17.8	6.1	17.6	6.7	17.2	12.8	16.8	15.7
1-6	3-5	16.3	5.3	16.1	6.0	15.7	11.2	15.2	13.8
1-7	3-5	14.9	4.7	14.8	5.3	14.3	10.3	14.1	12.4
1-4	---	14.2	4.4	14.2	5.0	13.7	9.7	13.5	11.6
1-7	4-6	13.4	4.0	13.3	4.4	12.7	8.8	12.5	10.4
1-6	4-5	12.4	3.6	12.4	3.9	11.7	7.9	11.7	9.5
1-7	4-5	11.7	3.3	11.7	3.5	11.1	7.4	11.1	8.7
		*1000 MFD.				**500 MFD.			

RT-202

Stancor Power Supply		Full-Wave C. T.				Full-Wave Bridge			
		Use with Sarkes-Tarzian Selenium Rectifier Part Nos. D-11				D-17			
		Output 4.0 A. D.C.				Output 2.0 A. D.C.			
		Resistive Load		Capacitive Load*		Resistive Load		Capacitive Load**	
Input 117vac Term. No.	Connect Term. No.	Secondary Volts AC	Output Volts DC	Secondary Volts AC	Output Volts DC	Secondary Volts AC	Output Volts DC	Secondary Volts AC	Output Volts DC
1-2	---	29.7	11.1	29.3	14.7	29.7	24.3	29.3	33.0
1-7	2-6	26.2	9.8	26.0	12.6	26.2	21.5	26.0	29.0
1-6	2-5	24.4	8.8	24.0	11.3	24.3	19.5	23.9	26.0
1-7	2-5	21.9	7.8	21.7	9.9	21.8	17.6	21.5	23.1
1-3	---	20.9	7.4	20.7	9.3	20.9	16.6	20.6	21.7
1-7	3-6	19.2	6.6	18.9	8.2	19.1	15.1	18.9	19.6
1-6	3-5	18.0	6.1	17.8	7.5	18.0	14.2	17.8	18.2
1-7	3-5	16.6	5.5	16.4	6.6	16.6	12.8	16.4	16.3
1-4	---	14.4	4.4	14.2	5.3	14.4	19.8	14.2	13.7
1-7	4-6	13.5	4.1	13.4	4.9	13.5	10.1	13.4	12.6
1-6	4-5	12.9	3.9	12.7	4.4	12.9	9.5	12.7	11.7
1-7	4-5	12.2	3.7	12.0	4.0	12.2	8.9	12.0	10.8
		*2000 MFD.				**1000 MFD.			

RT-204

Stancor Power Supply		Full-Wave C. T.				Full-Wave Bridge			
		Use with Sarkes-Tarzian Selenium Rectifier Part Nos. D-13				D-18			
		Output 8.0 A. D.C.				Output 4.0 A. D.C.			
		Resistive Load		Capacitive Load*		Resistive Load		Capacitive Load**	
Input 117vac Term. No.	Connect Term No.	Secondary Volts AC	Output Volts DC	Secondary Volts AC	Output Volts DC	Secondary Volts AC	Output Volts DC	Secondary Volts AC	Output Volts DC
1-2	---	29.2	12.0	28.8	14.5	29.2	24.0	29.0	32.4
1-7	2-6	25.7	10.5	25.7	12.6	25.7	21.1	25.4	29.2
1-6	2-5	22.8	9.2	22.8	10.9	22.8	18.7	22.7	25.7
1-7	2-5	20.6	8.3	20.6	9.6	20.7	16.6	20.6	22.8
1-3	---	19.3	7.7	19.3	8.7	19.4	15.4	19.0	21.0
1-7	3-6	17.6	7.0	17.6	7.8	17.8	14.0	17.6	19.0
1-6	3-5	16.2	6.3	16.2	6.9	16.3	12.7	16.1	17.2
1-7	3-5	15.0	5.8	15.0	6.3	15.1	11.6	14.9	15.6
1-4	---	14.2	5.4	14.2	5.8	14.4	11.0	14.2	14.8
1-7	4-6	13.3	5.0	13.3	5.3	13.4	10.2	15.3	13.5
1-6	4-5	12.5	4.6	12.5	4.9	12.6	9.4	12.5	12.4
1-7	4-5	11.7	4.3	11.7	4.5	11.8	8.8	11.6	11.4
		*4000 MFD.				**2000 MFD.			

Each transformer has the winding arrangement and terminal numbering shown in the schematic diagrams above.

The primary winding is connected to terminals 1, 2, 3 & 4. A separate winding is connected to terminals 5, 6 & 7 that may be used in series with the primary to raise or lower the secondary voltage output. A variety of combinations is possible using the taps on both windings, plus the "Aiding" or "Bucking" action of the extra winding.

Designed for 117 V. 50/60 cycle operation; may also be satisfactorily operated at 400 cycles.

The secondary winding of each transformer consists of two identical windings connected to terminals 8 & 9 and to 10 & 11 respectively. Use the tables showing the various output voltages for specific terminal connections as your guide. Many combinations are possible other than those listed in the tables.

All ratings shown are for normal convection air cooled applications. Select only rectifiers capable of handling the output voltages and currents described

SEE OTHER SIDE FOR STANCOR Part Nos. RT-206, 208, 2012, 408, 4012
Starkes-Tarzian Part Nos. D-14, 19, 15, 20, 16, 21, 27, 28

SARKES-TARZIAN RECTIFIER DIVISION
415 North College Avenue, Bloomington, Indiana

STANCOR ELECTRONICS INC.
3501 West Addison Street, Chicago 18, Illinois

PARALINE COMPANY
511 South Palm Avenue
Alhambra, CA 91803

PARKO ELECTRONICS
16722 MILLIKEN AVE
IRVINE, CA 92714

ATTN: TRANSFORMER BUYER

CATALOG 131

PARALINE
TRANSFORMER SPECIALISTS

PARALINE SS SERIES

THE PARALINE SS SERIES PROVIDES YOU WITH A WIDE RANGE OF SELECTION IN SMALL 117V PRIMARY POWER TRANSFORMERS (50-60 Hz) FROM SHELF STOCK.

AVAILABLE VOLTAGES CENTER TAPPED AND CURRENT RATINGS IN AMPS OF ALL SERIES SS TRANSFORMERS

VOLTS C/T	AMPERES						
	SIZE 3	SIZE 4	SIZE 5	SIZE 6	SIZE 7	SIZE 8	SIZE 9
4	.100	.50	1.2	2.8	5.2	10	14
6.3	.060	.32	.80	1.7	3.5	7.0	10
8	.050	.28	.60	1.4	2.8	5.0	7.0
10	.045	.20	.50	1.0	2.0	4.0	5.6
12.6	.040	.17	.40	.90	1.7	3.6	4.5
14	.040	.15	.35	.80	1.5	3.2	4.0
16	.038	.13	.32	.70	1.3	3.0	3.7
18	.035	.12	.30	.60	1.2	2.8	3.5
20	.032	.11	.27	.55	1.1	2.6	3.2
22	.030	.10	.25	.50	1.0	2.4	3.0
24	.027	.095	.22	.45	.95	2.2	2.7
26	.025	.090	.20	.40	.90	2.0	2.5
28	.022	.080	.18	.38	.85	1.8	2.2
30	.020	.070	.17	.36	.80	1.7	2.0
32	.018	.065	.16	.34	.75	1.6	1.9
34	.017	.060	.15	.32	.70	1.5	1.8
36	.016	.055	.14	.30	.65	1.4	1.7
40	.015	.050	.13	.27	.55	1.3	1.6
44	.014	.050	.12	.25	.50	1.2	1.5
48	.013	.045	.11	.22	.47	1.1	1.3
52	.012	.040	.10	.20	.45	1.0	1.2
56	.011	.040	.09	.19	.42	.90	1.1
60	.010	.035	.08	.18	.40	.80	1.0
66	.009	.030	.077	.17	.37	.75	.90
72	.008	.027	.070	.15	.35	.70	.85
80	.007	.025	.066	.14	.28	.65	.80
88	.007	.024	.060	.13	.25	.60	.70
96	.006	.022	.055	.11	.23	.55	.65
104	.006	.020	.050	.10	.22	.50	.60
120	.005	.017	.040	.09	.20	.40	.50
140		.014	.035	.08	.17	.35	.40
160		.012	.030	.07	.14	.30	.35
180		.011	.260	.06	.12	.26	.30
200		.010	.022	.05	.11	.22	.28
230		.010	.020	.05	.10	.20	.26

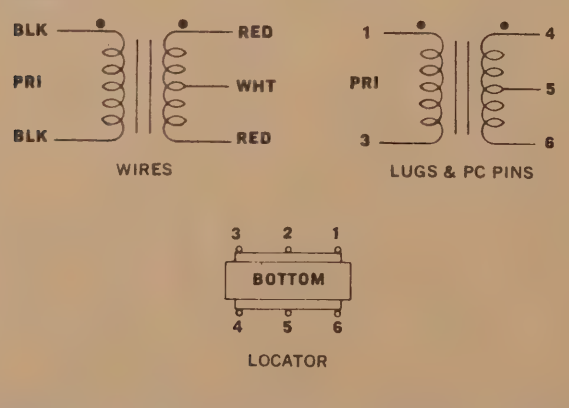
Case A Available in sizes 4, 5, 6, 7, 8 & 9 (Lead Wires)
Case B Available in sizes 4, 5 & 6 (Lugs)
Case C Available in sizes 3, 4, 5 & 6 (6 Pin P.C.)
Case D Available in sizes 4, 5 & 6 (Lugs)

SS SERIES DIMENSIONAL DATA

CASE	SIZE	WIDTH (A)	LENGTH (B)	HEIGHT (C)	MOUNTING CENTERS (D)	PIN CENTERS (JXK)
A	4	1.20	2.10	1.19	1.75	
A	5	1.37	2.38	1.38	2.00	
A	6	1.42	2.83	1.63	2.38	
A	7	1.70	3.25	1.94	2.83	
A	8	2.00	3.88	2.25	3.13	
B	4	1.07	1.83	1.42	1.50	
B	5	1.25	2.00	1.68	1.72	
B	6	1.38	2.38	1.93	2.00	
C	3	0.93	1.10	0.88		.78x.40
C	4	1.15	1.38	1.19		1.0x.63
C	5	1.25	1.63	1.38		1.1x.80
C	6	1.44	1.88	1.63		1.3x.80
D	4	1.07	2.10	1.19	1.75	
D	5	1.25	2.38	1.38	2.00	
D	6	1.38	2.83	1.63	2.38	

REFER TO SS SERIES TRANSFORMERS BY PART NUMBERS. CASES ARE ILLUSTRATED ON LAST PAGE.
SAMPLE: SS-A-4-12.6

SCHEMATICS



PARALINE DS SERIES

THE PARALINE DS SERIES PROVIDES YOU WITH GOOD OFF THE SHELF SELECTION OF 115/230 VOLT 50-60 Hz POWER TRANSFORMERS WITH DUAL SECONDARIES.

AVAILABLE TOTAL SERIES VOLTAGES AND CURRENT RATINGS OF SECONDARIES

VOLTS (SERIES)	AMPERES					
	SIZE 8	SIZE 9	SIZE 10	SIZE 11	SIZE 12	SIZE 13
8	6.0	8.5	12	17	24	30
10	5.0	7.0	10	14	20	24
12.6	4.0	5.6	8.0	11	16	19
14	3.5	5.0	7.0	10	14	17
16	3.0	4.4	6.2	8.7	12	15
18	2.8	3.9	5.5	7.7	11	13
20	2.5	3.5	5.0	7.0	10	12
22	2.3	3.2	4.5	6.3	9.0	11
24	2.0	2.9	4.1	5.8	8.3	10
26	1.9	2.7	3.8	5.4	7.8	9.2
28	1.8	2.5	3.6	5.0	7.1	8.5
30	1.7	2.3	3.3	4.6	6.6	8.0
32	1.6	2.2	3.1	4.3	6.2	7.5
34	1.5	2.0	2.9	4.1	5.8	7.0
36	1.4	1.9	2.7	3.8	5.5	6.6
40	1.3	1.7	2.5	3.5	5.0	6.0
44	1.1	1.6	2.2	3.1	4.5	5.4
48	1.0	1.4	2.1	2.9	4.1	5.0
52	1.0	1.3	1.9	2.7	3.8	4.6
56	.90	1.2	1.8	2.5	3.5	4.2
60	.80	1.1	1.7	2.3	3.3	4.0
66	.75	1.0	1.5	2.1	3.0	3.6
72	.70	1.0	1.4	1.9	2.7	3.3
80	.63	.90	1.2	1.7	2.5	3.0
88	.56	.80	1.1	1.6	2.2	2.7
96	.52	.70	1.0	1.4	2.0	2.5
104	.48	.66	.95	1.3	1.9	2.3
120	.42	.58	.83	1.1	1.6	2.0
140	.36	.50	.71	1.0	1.4	1.7
160	.31	.43	.62	.87	1.2	1.5
180	.28	.38	.55	.77	1.1	1.3
200	.25	.35	.50	.70	1.0	1.2
230	.22	.30	.43	.60	.86	1.0

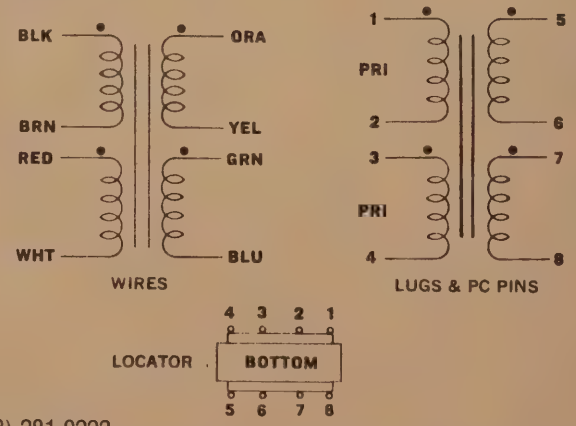
DS SERIES TRANSFORMER SIZES 8 AND 9 ARE AVAILABLE IN STYLES:
"A" (with lead wires)
"B" (with lugs)
"D" (with lugs)

DS SERIES TRANSFORMER SIZES 10 THRU 13 ARE AVAILABLE IN STYLES:
"F" (with lead wires)
"G" (with lugs)
"H" (with lugs)

DS SERIES DIMENSIONAL DATA

CASE	SIZE	A	B	C	D	E	F	G
A	8	2.00	3.70	2.25	3.13		2.70	.19
A	9	2.30	4.00	2.56	3.56		3.06	.19
B	8	2.00	3.13	2.70	2.81		2.27	.19
B	9	2.30	3.56	3.06	3.13		2.56	.19
D	8	2.00	3.70	2.25	3.13		2.70	.19
D	9	2.30	4.00	2.56	3.56		3.06	.19
F	10	3.38	2.50	2.81	2.81	2.13	2.69	.2x.37
F	11	3.75	2.80	3.13	3.13	2.25	2.81	.2x.37
F	12	4.13	3.00	3.44	3.44	2.38	2.94	.2x.37
F	13	4.50	3.30	3.75	3.75	2.50	3.06	.2x.37
G	10	2.81	2.50	3.38	2.25	2.13	2.69	.2x.37
G	11	3.13	2.80	3.75	2.50	2.25	2.81	.2x.37
G	12	3.44	3.00	4.13	2.75	2.38	2.94	.2x.37
G	13	3.75	3.30	4.50	3.00	2.50	3.06	.2x.37
H	10	3.38	2.50	2.81	2.81	2.13	2.69	.2x.37
H	11	3.75	2.80	3.13	3.13	2.25	2.81	.2x.37
H	12	4.13	3.00	3.44	3.44	2.38	2.94	.2x.37
H	13	4.50	3.30	3.75	3.75	2.50	3.06	.2x.37

SCHEMATICS



PARALINE, 511 South Palm Avenue, Alhambra, CA 91803 • (818) 281-0222

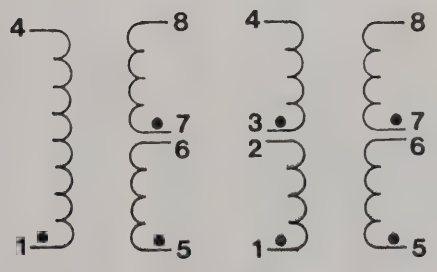
The Paraline HP & DHP Series are available in sizes 3, 4, 5, 6, 7, & 8 with single or dual primaries and dual secondaries on an 8 pin printed circuit format.

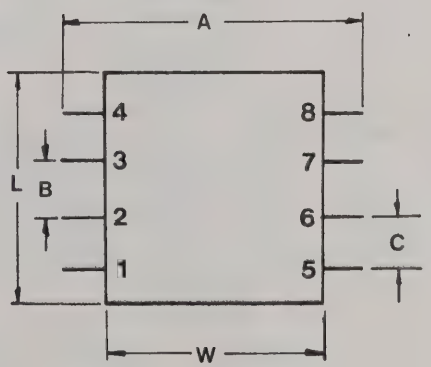
Available total series voltages and current ratings of secondaries.

HP & DHP SERIES

Volts*	AMPERES					
	Size 3	Size 4	Size 5	Size 6	Size 7	Size 8
5	.20	.46	1.16	2.3	3.8	7.0
6.3	.15	.36	.92	1.8	3.0	5.5
8	.12	.28	.72	1.4	2.3	4.3
10	.10	.23	.58	1.1	1.9	3.5
12	.079	.18	.46	.97	1.5	2.9
14	.071	.16	.41	.83	1.3	2.5
16	.062	.14	.36	.73	1.1	2.1
18	.055	.12	.32	.65	1.0	1.9
20	.050	.11	.29	.58	.95	1.7
22	.045	.10	.26	.53	.86	1.5
24	.041	.095	.24	.48	.79	1.4
26	.038	.088	.22	.45	.73	1.3
28	.035	.082	.20	.41	.67	1.2
30	.033	.076	.19	.39	.63	1.1
32	.031	.071	.18	.36	.59	1.0
34	.029	.067	.17	.34	.55	1.0
36	.027	.063	.16	.32	.52	.97
40	.025	.057	.14	.29	.47	.87
44	.022	.052	.13	.26	.43	.79
48	.020	.047	.12	.24	.39	.72
52	.019	.044	.11	.22	.36	.67
56	.017	.041	.10	.20	.33	.62
60	.016	.038	.096	.19	.31	.58
66	.015	.034	.087	.17	.28	.53
72	.013	.031	.080	.16	.26	.48
80	.012	.028	.072	.14	.23	.43
88	.011	.026	.065	.13	.21	.39
96	.010	.023	.060	.12	.19	.36
104	.009	.022	.055	.11	.18	.33
120	.008	.019	.048	.097	.15	.29
140	.007	.016	.041	.083	.13	.25
160	.006	.014	.036	.073	.11	.21
180	.005	.012	.032	.065	.10	.19
200	.005	.011	.029	.058	.095	.17
230	.004	.010	.025	.050	.082	.15

* HP Series—Volts C/T
DHP Series—Total Series Volts





HP & DHP DIMENSIONAL DATA

Sizes	L	W	Ht	A	B	C	Wt
3	1.375	1.125	.937	1.20	.250	.250	.17
4	1.375	1.125	1.187	1.20	.250	.250	.25
5	1.625	1.312	1.312	1.28	.350	.250	.44
6	1.875	1.562	1.437	1.41	.400	.300	.70
7	2.250	1.875	1.437	1.60	.400	.300	.80
8	2.625	2.187	1.562	1.85	.400	.400	1.10

PARALINE, 511 South Palm Avenue, Alhambra, CA 91803 • Telephone (818) 281-0222

PARALINE

The Paraline DLP & MLP Series are available in sizes 4, 5, & 6 with dual primary and dual secondary 12 pin printed circuit configuration. All have 2 separate center tap secondaries.

Available total series voltages and current ratings of secondaries.

DLP SERIES

VOLTS (Series)	AMPERES		
	Size 4	Size 5	Size 6
5	.46	1.10	2.3
6.3	.36	.87	1.8
8	.28	.68	1.4
10	.23	.55	1.1
12.6	.18	.43	.91
14	.16	.39	.82
16	.14	.34	.71
18	.12	.30	.63
20	.11	.27	.57
22	.10	.25	.52
24	.095	.22	.47
26	.088	.21	.44
28	.082	.19	.41
30	.076	.18	.38
32	.071	.17	.36
34	.067	.16	.33
36	.063	.15	.31
40	.057	.13	.28
44	.052	.12	.26
48	.047	.11	.23
52	.044	.10	.22
56	.041	.098	.20
60	.038	.091	.19
66	.034	.083	.17
72	.031	.076	.15
80	.028	.068	.14
88	.026	.062	.13
96	.023	.057	.11
104	.022	.052	.11
120	.019	.045	.095
140	.016	.039	.082
160	.014	.034	.071
180	.012	.030	.063
200	.011	.027	.057
230	.010	.023	.050

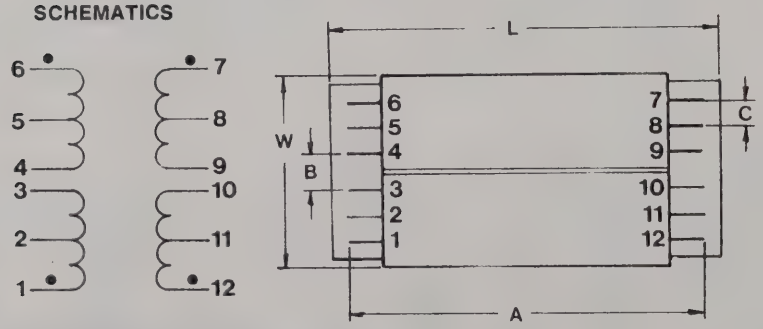
MLP SERIES

Part #	Sec. #1 V/CT	MA.	Sec. #2 V/CT	MA.
MLP4-9024	9.0	.12	24	.047
MLP5-9024	9.0	.30	24	.11
MLP6-9024	9.0	.63	24	.23
MLP4-1632	16	.071	32	.035
MLP5-1632	16	.17	32	.085
MLP6-1632	16	.35	32	.17

DLP & MLP DIMENSIONAL DATA

Size	L	W	H	A	B	C	Lbs.
4	1.875	1.562	.650	1.60	.375	.187	.29
5	1.875	1.562	.850	1.60	.375	.187	.43
6	2.50	2.0	1.065	2.0	.500	.250	.67

SCHEMATICS



DOT INDICATES LIKE POLARITY

100 VOLT PRIMARY CENTER TAPS AVAILABLE UPON REQUEST.
ALL PARALINE TRANSFORMERS MAY BE USED FOR 50 OR 60 HZ APPLICATIONS.

PARALINE, 511 South Palm Avenue, Alhambra, CA 91803 • Telephone (818) 281-0222

SS & CS SERIES

SIZE	1-3	4-49	50-249	250	1K
3	4.24	3.58	3.25	3.07	2.96
4	5.21	4.35	3.70	3.49	3.35
5	5.81	4.83	4.16	3.95	3.79
6	6.82	5.73	4.84	4.61	4.43
7	8.14	6.81	5.78	5.48	5.26
8	10.40	8.77	7.37	7.00	6.72
9	11.79	9.84	8.70	8.25	7.92

DS SERIES

SIZE	1-3	4-49	50-249	250	1K
4	5.73	4.80	4.05	3.86	3.71
5	6.38	5.30	4.57	4.35	4.17
6	7.49	6.29	5.28	5.07	4.86
7	9.66	7.94	6.64	6.35	6.10
8	11.38	9.58	7.99	7.63	7.34
9	12.27	10.26	9.03	8.66	8.31
10	14.79	12.59	11.24	10.77	10.35
11	17.64	15.15	13.81	13.27	12.73
12	23.00	19.96	18.48	17.74	17.03
13	26.85	23.45	21.84	20.95	20.11
14	40.83	35.34	31.87	30.56	29.33

MS SERIES	1-3	4-49	50-249	250	1K
MSC4-924	7.40	6.64	6.19	5.89	5.64
MSC5-924	7.99	7.19	6.68	6.36	6.11
MSC6-924	8.87	7.98	7.42	7.05	6.76
MSC4-1632	7.40	6.64	6.19	5.89	5.64
MSC5-1632	7.99	7.19	6.68	6.36	6.11
MSC6-1632	8.87	7.98	7.42	7.05	6.76
MSL4-9024	9.18	8.26	7.67	7.29	7.00
MSL5-9024	10.20	9.19	8.54	8.12	7.79
MSL6-9024	11.98	10.76	10.03	9.52	9.14
MSL7-9024	14.34	12.91	12.00	11.39	10.94
MSL4-16032	9.18	8.26	7.67	7.29	7.00
MSL5-16032	10.20	9.19	8.54	8.12	7.79
MSL6-16032	11.98	10.76	10.03	9.52	9.14
MSL7-16032	14.34	12.91	12.00	11.39	10.94
MSH10-16032	19.16	17.25	16.04	15.25	14.63
MSH11-16032	22.87	20.58	19.14	18.18	17.46
MSH12-16032	29.83	26.85	23.61	21.27	20.44
MSH13-16032	33.48	30.14	27.10	24.60	23.60
MSD9-16032	15.29	13.75	12.65	12.07	11.58

TTC SERIES

SIZE	1-3	4-49	50-249	250	1K
TTC2-07	6.05	5.26	4.61	4.21	4.06
TTC3-6549	4.42	3.83	3.07	2.46	2.37
TTC3-7222	4.46	3.91	3.12	2.52	2.42
TTC4-18	4.23	3.66	3.46	3.23	3.07
TTC4-7226	4.56	4.24	3.74	3.09	2.98
TTC4-7657	4.63	4.34	3.78	3.12	3.01
TTC2-8746	9.00	7.90	7.17	6.47	6.24
TTC2-8750	8.65	7.56	6.82	6.15	5.90
TTC2-8758	9.00	7.90	7.17	6.47	6.24
TTC2-8761	9.00	7.90	7.17	6.47	6.24
TTC2-8762	9.00	7.90	7.17	6.47	6.24
TTC2-8763	9.00	7.90	7.17	6.47	6.24
TTC2-8772	8.20	7.13	6.37	5.72	5.48

MLP & DLP SERIES

SIZE	1-3	4-49	50-249	250	1K
4	7.32	5.76	4.47	4.12	3.95
5	8.07	6.36	4.93	4.54	4.36
6	9.72	7.65	5.95	5.48	5.25

HP SERIES

3	5.49	4.32	3.36	3.08	2.97
4	5.59	4.41	3.43	3.15	3.03
5	6.20	4.87	3.79	3.49	3.36
6	6.84	5.39	4.17	3.85	3.70
7	8.24	6.49	5.06	4.65	4.46
8	9.21	7.41	5.63	5.18	4.97

DHP SERIES

3	6.38	5.02	3.90	3.61	3.46
4	6.58	5.17	3.79	3.49	3.34
5	7.07	5.46	4.32	3.99	3.82
6	8.14	6.16	4.58	4.21	4.04
7	9.67	7.60	5.92	5.45	5.23
8	10.64	8.38	6.52	6.00	5.75

QUOTES ON LARGER QUANTITIES ARE AVAILABLE FROM OUR SALES DEPT.

TERMS: NET 30 DAYS, UPON APPROVAL OF CREDIT, 1% DISCOUNT FOR PAYMENT WITHIN TEN DAYS

PRICES AND SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

ALL ORDERS: F.O.B. ALHAMBRA CA 91803

MINIMUM ORDER: $20.00

PARALINE
TRANSFORMER SPECIALISTS

511 South Palm Avenue
Alhambra, CA 91803
818-281-0222

PARALINE
TRANSFORMER SPECIALISTS

PARALINE DS SERIES

THE PARALINE DS SERIES IS AVAILABLE IN SIZES 4, 5, & 6 WITH DUAL PRIMARY AND DUAL SECONDARY 8 PIN PRINTED CIRCUIT CONFIGURATION.

AVAILABLE TOTAL SERIES VOLTAGES AND CURRENT RATINGS OF SECONDARIES.

VOLTS (SERIES)	AMPERES		
	SIZE 4	SIZE 5	SIZE 6
4	.50	1.2	2.8
6.3	.32	.80	1.7
8	.28	.60	1.4
10	.20	.50	1.0
12.6	.17	.40	.90
14	.15	.35	.80
16	.13	.32	.70
18	.12	.30	.60
20	.11	.27	.55
22	.10	.25	.50
24	.095	.22	.45
26	.090	.20	.40
28	.080	.18	.38
30	.070	.17	.36
32	.065	.16	.34
34	.060	.15	.32
36	.055	.14	.30
40	.050	.13	.27
44	.050	.12	.25
48	.045	.11	.22
52	.040	.10	.20
56	.040	.09	.19
60	.035	.08	.18
66	.030	.077	.17
72	.027	.070	.15
80	.025	.066	.14
88	.024	.060	.13
96	.022	.055	.11
104	.020	.050	.10
120	.017	.040	.09
140	.014	.035	.08
160	.012	.030	.07
180	.011	.026	.06
200	.010	.022	.05
230	.010	.020	.05

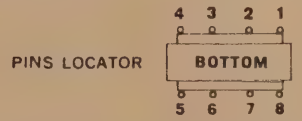
DS SERIES DIMENSIONAL DATA

CASE	SIZE	A	C	F	H	J	K
C	4	1.15	1.19	1.38	.20	1.0	.60
C	5	1.25	1.38	1.63	.25	1.1	.75
C	6	1.44	1.63	1.88	.25	1.3	.75

REFER TO DS SERIES TRANSFORMERS BY PART NUMBERS.

SAMPLE: DS — C — 4 — 12.6

SERIES — STYLE — SIZE — TOTAL SERIES VOLTS



Paraline manufactures a wide variety of power transformers. They are stocked in 11 different sizes with 32 available secondary voltages totaling over 1600 different types.

There are five general series designations, each series designed to suit the requirements of your particular application.

A brief description of each series is as follows:

- The "SS" series has a single 115V primary and a single center-tapped secondary. Also available with a 230V primary.
- The "CS" series has a single 115V primary and two identical and separate secondaries. Also available with a 230V primary.
- The "DS" series has dual primaries for 115V or 230V operation and two identical and separate secondaries.
- The "MS" series has dual primaries for 115V or 230V operation and two center-tapped secondaries designed for 5V and 15V logic and OP amp power supplies.
- The "TT" series includes a number of coupling transformers, holding coils, and telephone associated devices for use in interconnective data modem terminals.

All Paraline stock power transformers may be used for 50 Hz or 60 Hz applications.

PARALINE CS SERIES

THE PARALINE CS SERIES WITH STANDARD 117V (50-60 Hz) PRIMARIES IS AVAILABLE FROM STOCK WITH SINGLE PRIMARY AND DUAL SECONDARY 6 PIN PRINTED CIRCUIT CONFIGURATION.

AVAILABLE TOTAL SERIES VOLTAGES AND CURRENT RATINGS OF SECONDARIES

VOLTS (SERIES)	AMPERES		
	SIZE 4	SIZE 5	SIZE 6
4	.50	1.2	2.8
6.3	.32	.80	1.7
8	.28	.60	1 4
10	.20	.50	1.0
12.6	.17	.40	.90
14	.15	.35	.80
16	.13	.32	.70
18	.12	.30	.60
20	.11	.27	.55
22	.10	.25	.50
24	.095	.22	.45
26	.090	.20	.40
28	.080	.18	.38
30	.070	.17	.36
32	.065	.16	.34
34	.060	.15	.32
36	.055	.14	.30
40	.050	.13	.27
44	.050	.12	.25
48	.045	.11	.22
52	.040	.10	.20
56	.040	.09	.19
60	.035	.08	.18
66	.030	.077	.17
72	.027	.070	.15
80	.025	.066	.14
88	.024	.060	.13
96	.022	.055	.11
104	.020	.050	.10
120	.017	.040	.09
140	014	.035	.08
160	.012	.030	.07
180	.011	.026	.06
200	.010	.022	.05
230	.010	.020	05

CS SERIES DIMENSIONAL DATA

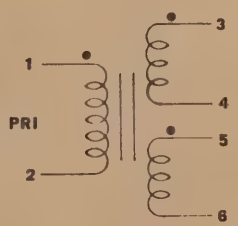
CASE	SIZE	A	C	F	H	J	K
C	4	1.15	1.19	1.38	.31	1.0	.63
C	5	1.25	1.38	1.63	.40	1.1	.80
C	6	1.44	1.63	1.88	.40	1.3	.80

REFER TO CS SERIES TRANSFORMERS BY PART NUMBERS.

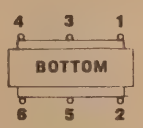
SAMPLE: CS — C — 4 — 12.6

SERIES — STYLE — SIZE — TOTAL SERIES VOLTS

SCHEMATIC



PINS



PINS LOCATOR

PARALINE, 511 South Palm Avenue, Alhambra, CA 91803 • (818) 281-0222

PARALINE
TRANSFORMER SPECIALISTS

PARALINE MS SERIES

8 PIN P.C. WITH SINGLE 120V PRIMARY. (Fig. 1)

PART NUMBER	SEC. #1 V/CT	MA.	SEC. #2 V/CT	MA.
MSC4-824	9.0	70	24	30
MSC5-824	9.0	240	24	70
MSC6-824	9.0	480	24	150
MSC4-1632	16	50	32	18
MSC5-1632	16	140	32	55
MSC6-1632	16	280	32	100

12 PIN P.C. LOW PROFILE DUAL 120V PRIMARIES WITH 100V TAPS. (Fig. 2)

PART NUMBER	SEC. #1 V/CT	MA.	SEC. #2 V/CT	MA.
MSL4-9024	9.0	70	24	28
MSL5-9024	9.0	240	24	70
MSL6-9024	9.0	480	24	150
MSL7-9024	9.0	800	24	280
MSL4-16032	16	50	32	18
MSL5-16032	16	140	32	55
MSL6-16032	16	280	32	100
MSL7-16032	16	500	32	180

12 LUGS CASE 'H' DUAL 120V PRIMARIES WITH 100V TAPS. (Fig. 3)

PART NUMBER	SEC. #1 V/CT	AMPS	SEC. #2 V/CT	AMPS
MSH10-16032	16	3.8	32	1.2
MSH11-16032	16	5.0	32	1.8
MSH12-16032	16	7.0	32	2.5
MSH13-16032	16	9.0	32	3.0

SCHEMATICS

FIG. 1

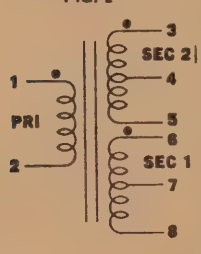


FIG. 2

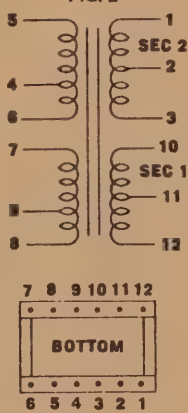
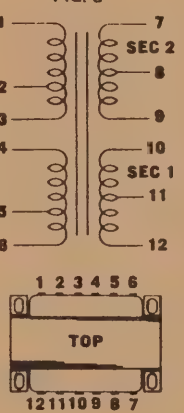


FIG. 3



PARALINE TT SERIES

TRANSFORMERS FOR DATA MODEM TERMINALS DESIGNED TO EXCEED 1200 VAC BREAKDOWN REQUIREMENTS.
FREQUENCY RESPONSE: 300-3500 Hz (TOL. 0.5 DB)
LEVEL: −45DBM TO +7DBM
DISTORTION: 0.4% MAX.
IMPEDANCE: ±10%
RETURN LOSS: 26 DB MIN.

PART NUMBER	PRI. IMP.	SEC. IMP.	FIG.
TTC2-07	600	600	1
TTC3-6549	600	600	1
TTC3-7222	600	600 +900	2
TTC4-7226	600	600	1
TTC4-7657	600	600 +900	2
TTC4-18	Holding Coil 1.3 Hy. @ 100 MA. DC.		—

WIDE RANGE AUDIO MATCHING TRANSFORMERS.
FREQUENCY RESPONSE: 20 Hz (TOL. 2 DB)
LEVEL: 5DBM

PART NUMBER	PRI. IMP.	SEC. IMP.	FIG.
TTC2-8746	400	40K	3
TTC2-8750	200	40K	1
TTC2-8758	200/CT/50	50K	3
TTC2-8761	600/CT/150	50K	3
TTC2-8762	250/CT/62	50K	3
TTC2-8763	50/CT/12	50K	3
TTC2-8772	150	60K	1

SCHEMATICS

FIG. 1

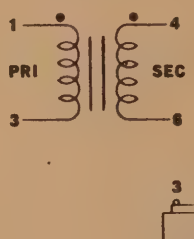


FIG. 2

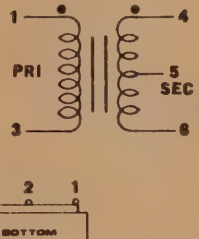
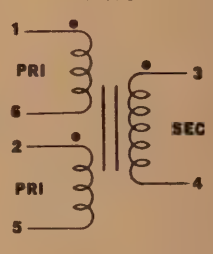
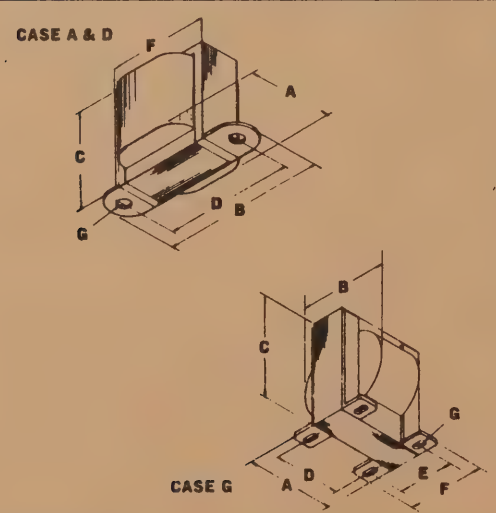


FIG. 3



PINS LOCATOR



PARALINE, 511 South Palm Avenue, Alhambra, CA 91803 • (818) 281-0222

STANCOR

3501 W. ADDISON ST. CHICAGO, ILL. 60618

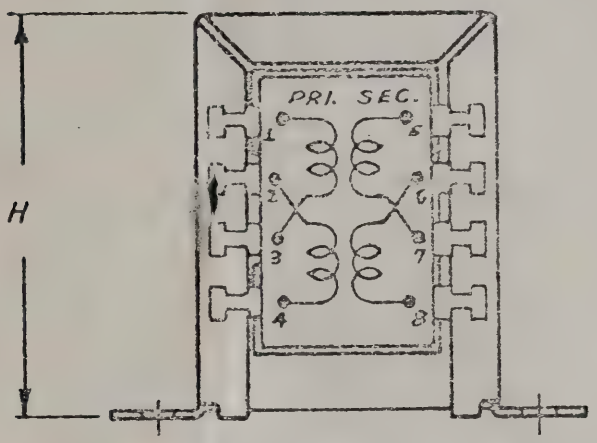
part no. P-6375
P-6376
P-6377

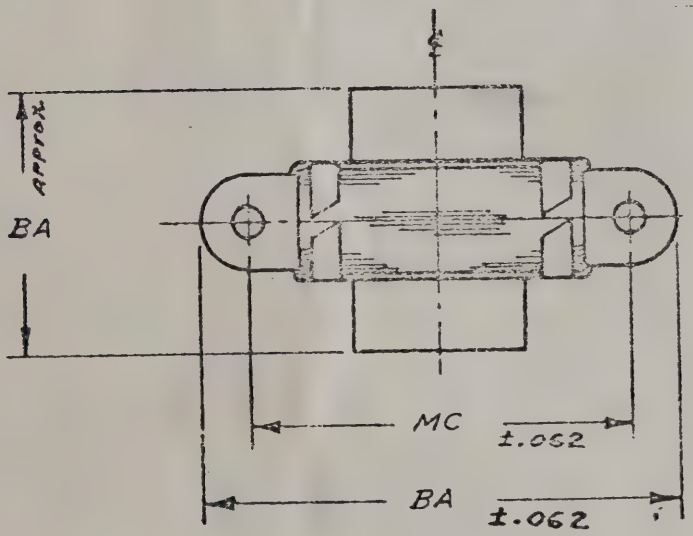
type Control Transformers

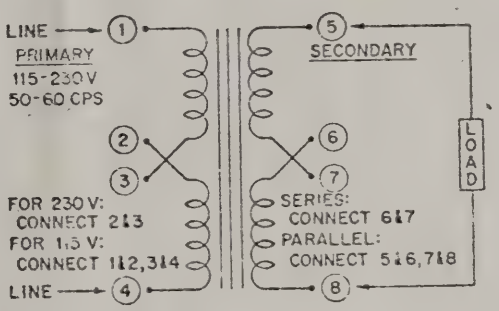
date 5-15-69

s.d.s. no. 6-1069

SERVICE DATA SHEET





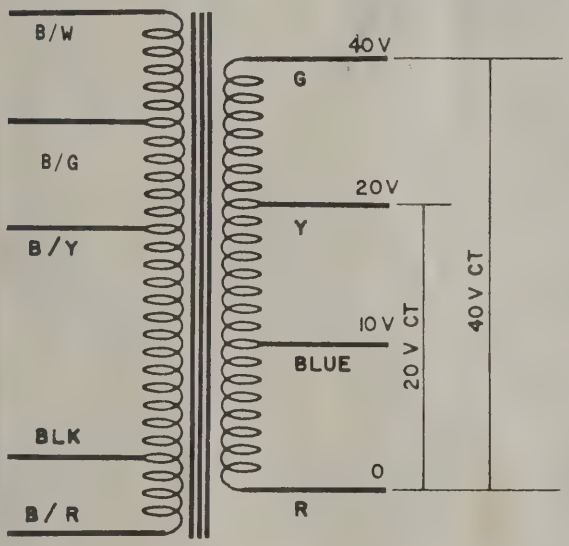


Stancor Part No.	Primary	Secondary		VA Rating	Mtg. Type	Mtg. Ctrs.	Shpg. Wt. in Lbs.	Height Overall	Base Area
		Parallel	Series						
P-6375		6V @ 2A	12V @ 1A	12	J	2⅜"	1	2⅜"	2⅞" x 1¾"
P-6376	115V/230V	6V @ 4A	12V @ 2A	24	J	2 13/16"	1½	3⅝"	3⅛" x 2"
P-6377	50/60 CPS	12V @ 4A	24V @ 2A	48	J	3⅛"	2½	3⅛"	3⅝" x 2⅜"
	on all								

RECTIFIER POWER TRANSFORMERS

F-90X	F-91X	F-92A	F-93X	F-94X
100MaDC	300MaDC	1ADC	750MaDC	35MaDC

Voltages: 10/20ct or 40ct



These transformers are designed for use with silicon diode rectifiers, to supply the DC voltages for transistors in their various applications. They are intended for use with full wave bridge or bridge rectifier, but may be used with voltage doubler circuits at one-half of the rated current.

CAUTION: Never apply the full line voltage (115 volts) between the Black/Red and Black leads of the primary. One of these leads is used as a primary common lead in all applications. The lowest output voltage is obtained when the available line voltage is applied to the Black/Red and Black/White primary leads.

SECONDARY AC VOLTAGES OBTAINABLE

40VCT, 38VCT, 34VCT, 32VCT, 30VCT,
28VCT, 20VCT, 19VCT, 17VCT, 16VCT,
15VCT, 14VCT,

30V, 28.5V, 25.5V, 24V, 22.5V, 21V,
10V, 9.5V, 8.5V, 8V, 7.5V, 7V

PRIMARY 115VOLTS AC 60CPS		SECONDARY			
Lead	Lead	Leads Green Red	Leads Green Blue	Leads Yellow Red	Leads Blue Red
Black/Yellow Black/Yellow	Black Black/Red	40V CT Yellow 38V CT Yellow	30V 28.5V	20V CT Blue 19V CT Blue	10V 9.5V
Black/Green Black/Green	Black Black/Red	34V CT Yellow 32V CT Yellow	25.5V 24V	17V CT Blue 16V CT Blue	8.5V 8V
Black/White Black/White	Black Black/Red	30V CT Yellow 28V CT Yellow	22.5V 21V	15V CT Blue 14V CT Blue	7.5V 7V

A DIVISION OF LITTON INDUSTRIES

TRIAD DISTRIBUTOR DIVISION
305 North Briant Street
Huntington, Indiana

STANCOR

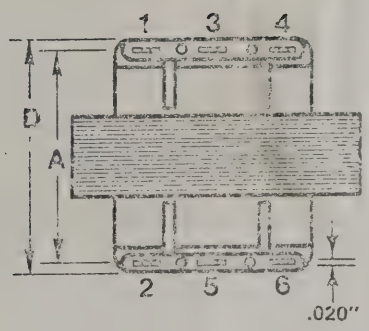
ESSEX INTERNATIONAL, INC.
SUBSIDIARY OF UNITED AIRCRAFT CORPORATION
CONTROLS DIVISION
3501 W. ADDISON ST., CHICAGO, ILL. 60618

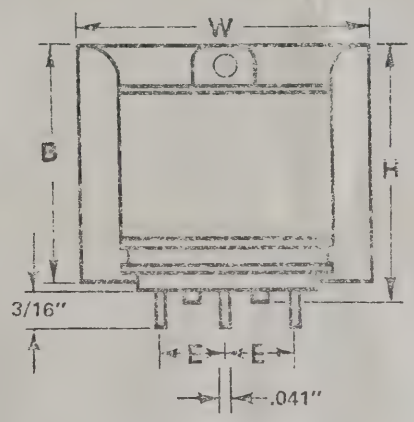
Part No. PPC-1 THRU PPC-27
Type POWER TRANSFORMER
Date 10-74 (REVISED 3-75)
S.D.S. No. 6-1073

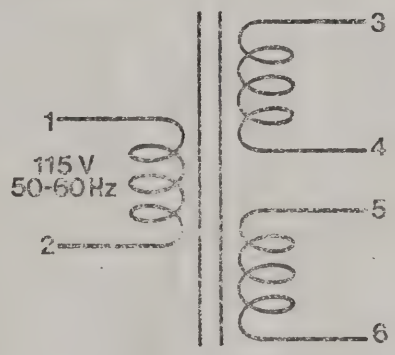
☐ SERVICE DATA SHEET

MINIATURE POWER TRANSFORMERS

- For Printed Circuit Board Mountings with Molded-In Plug-In Type Terminals.
- All with Single Primary: 115 Volt, 50-60 Hz. Input.
- Hi-Pot Test: 500 Volts RMS between all Windings and to Core.
- Class "A" Insulation, 105°C. Maximum Operating Temperature Limit.







DIMENSIONS
All Tolerances on Dimensions are ± 1/32" except A = ±1/16"

H = 1 3/16"
W = 1 3/8"
D = 1 1/8"
A = 1.0"
B = 1 1/8"
E = 5/16"

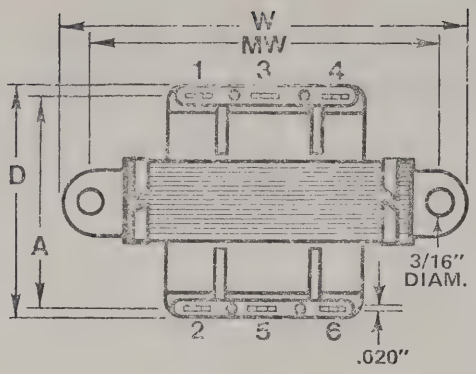
PARALLEL
Connect 3 & 5, 4 & 6
Use 3 & 4

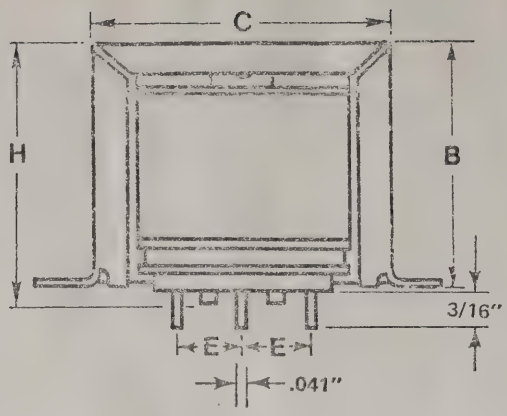
or

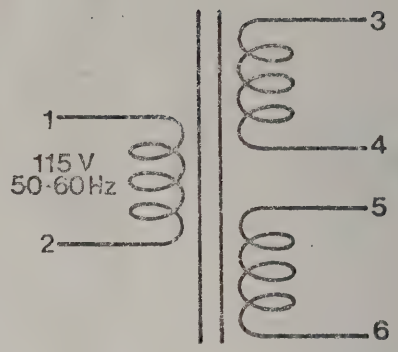
SERIES
Connect 4 & 5
Use 3 & 6

STANCOR Part No.	STYLE	VA Cap.	OUTPUT FROM TWO SECONDARY WINDINGS			WT. Lbs.
			INDIVIDUALLY	PARALLEL	SERIES	
PPC-1	PC	1.5	4 V @ .188 A	4 V @ .376 A	8 V CT @ .188 A	.22
PPC-2	PC	1.5	7.5 V @ .100 A	7.5 V @ .200 A	15 V CT @ .100 A	.22
PPC-3	PC	1.5	15 V @ .050 A	15 V @ .100 A	30 V CT @ .050 A	.22
PPC-4	PC	1.5	27 V @ .028 A	27 V @ .056 A	54 V CT @ .028 A	.22
PPC-5	PC	1.5	38 V @ .020 A	38 V @ .040 A	76 V CT @ .020 A	.22
PPC-6	PC	1.5	58 V @ .013 A	58 V @ .026 A	116 V CT @ .013 A	.22
PPC-7	PC	1.5	20 V @ .038 A	20 V @ .076 A	40 V CT @ .038 A	.22

(OVER)







DIMENSIONS

All Tolerances
on Dimensions are ± 1/32"
except A = ± 1/16"; W = ± 1/16";
and MW = ± 1/16".

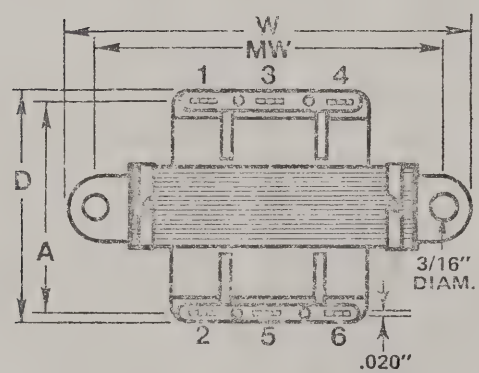
H = 1 7/16" A = 1.1"
W = 2 3/8" B = 1 3/8"
D = 1 1/4" C = 1 23/32"
MW = 2" E = 0.4"

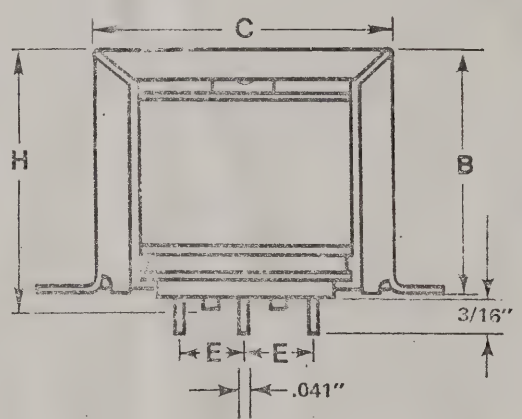
PARALLEL
Connect 3 & 5, 4 & 6
Use 3 & 4

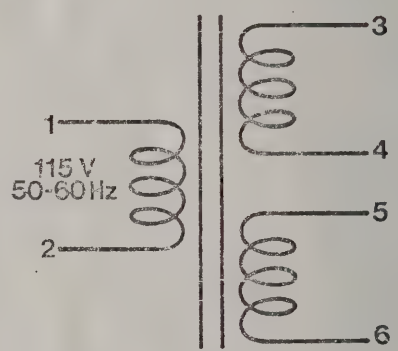
or

SERIES
Connect 4 & 5
Use 3 & 6

STANCOR Part No.	STYLE	VA Cap.	OUTPUT FROM TWO SECONDARY WINDINGS			WT. Lbs.
			INDIVIDUALLY	PARALLEL	SERIES	
PPC-11	APC	4.5	4 V @ .562 A	4 V @ 1.13 A	8 V CT @ .562 A	.47
PPC-12	APC	4.5	7.5 V @ .300 A	7.5 V @ .600 A	15 V CT @ .300 A	.47
PPC-13	APC	4.5	15 V @ .150 A	15 V @ .300 A	30 V CT @ .150 A	.47
PPC-14	APC	4.5	27 V @ .084 A	27 V @ .168 A	54 V CT @ .084 A	.47
PPC-15	APC	4.5	38 V @ .060 A	38 V @ .120 A	76 V CT @ .060 A	.47
PPC-16	APC	4.5	58 V @ .033 A	58 V @ .066 A	116 V CT @ .033 A	.47
PPC-17	APC	4.5	20 V @ .112 A	20 V @ .224 A	40 V CT @ .112 A	.47







DIMENSIONS

All Tolerances
on Dimensions are ± 1/32"
except A = ± 1/16"; W = ± 1/16";
and MW = ± 1/16".

H = 1 11/16" A = 1.3"
W = 2 13/16" B = 1 5/8"
D = 1 7/16" C = 1 31/32"
MW = 2 3/8" E = 0.4"

PARALLEL
Connect 3 & 5, 4 & 6
Use 3 & 4

or

SERIES
Connect 4 & 5
Use 3 & 6

STANCOR Part No.	STYLE	VA Cap.	OUTPUT FROM TWO SECONDARY WINDINGS			WT. Lbs.
			INDIVIDUALLY	PARALLEL	SERIES	
PPC-21	APC	7.5	4 V @ .940 A	4 V @ 1.88 A	8 V CT @ .940 A	.66
PPC-22	APC	7.5	7.5 V @ .500 A	7.5 V @ 1.00 A	15 V CT @ .500 A	.66
PPC-23	APC	7.5	15 V @ .250 A	15 V @ .500 A	30 V CT @ .250 A	.66
PPC-24	APC	7.5	27 V @ .140 A	27 V @ .280 A	54 V CT @ .140 A	.66
PPC-25	APC	7.5	38 V @ .100 A	38 V @ .200 A	76 V CT @ .100 A	.66
PPC-26	APC	7.5	58 V @ .065 A	58 V @ .130 A	116 V CT @ .065 A	.66
PPC-27	APC	7.5	20 V @ .188 A	20 V @ .376 A	40 V CT @ .188 A	.66

STANCOR

ESSEX INTERNATIONAL, INC.
SUBSIDIARY OF UNITED AIRCRAFT CORPORATION
CONTROLS DIVISION
3501 W. ADDISON ST., CHICAGO, ILL. 60618

Part No. PPC-8 PPC-18 PPC-19 PPC-20 PPC-28 PPC-29

Type MINIATURE POWER TRANSFORMERS

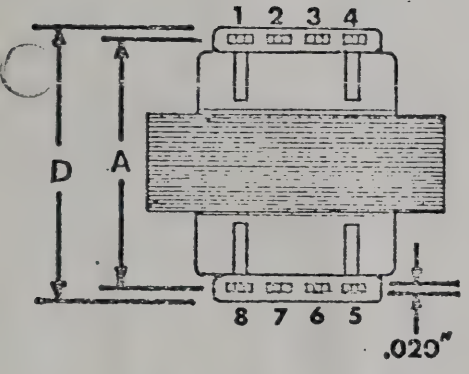
Date 1/10/78

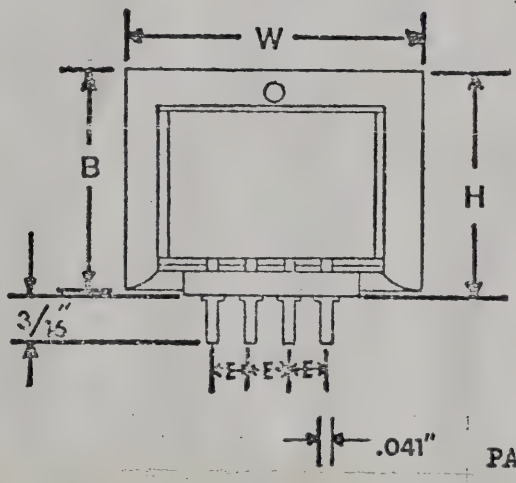
S.D.S. No. 6-1075

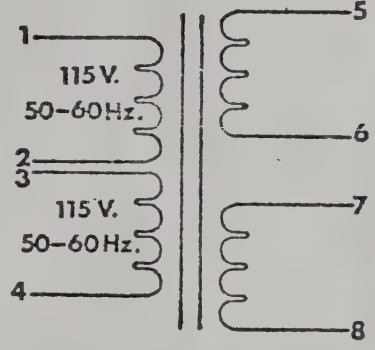
SERVICE DATA SHEET

MINIATURE POWER TRANSFORMERS

For Printed Circuit Board Mountings with Molded-In Type Terminals.
All with Dual Primary: 115 or 230 Volt, 50-60 Hz. Input.
Hi-Pot Test: 500 Volts RMS between all Windings and to Core.
Class "A" Insulation, 105°C. Maximum Operating Temperature Limit.







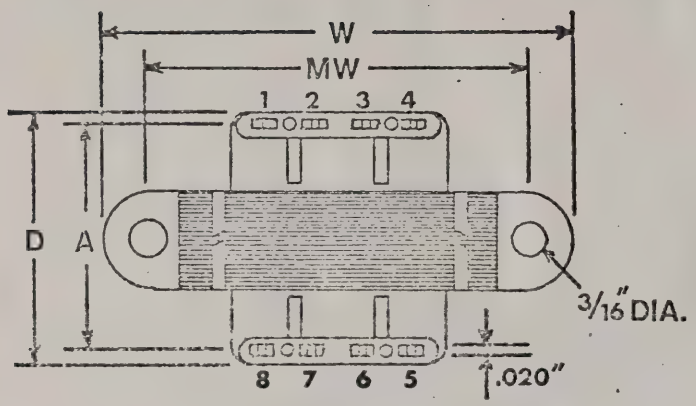
DIMENSIONS
All Tolerances on Dimensions are ± 1/32" except A = ±1/16"

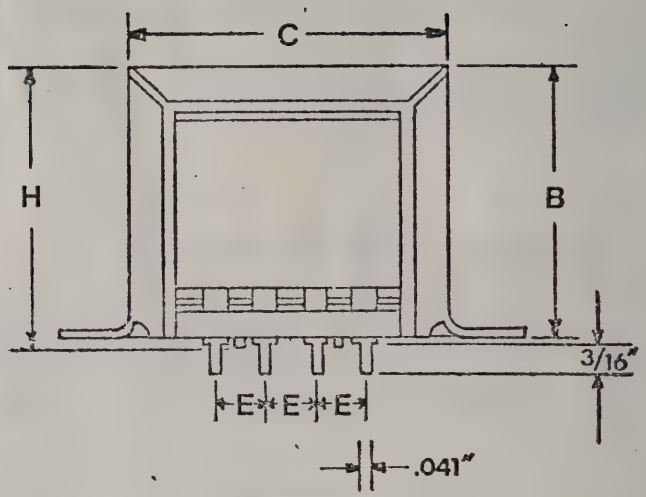
H = 1 3/16"
W = 1 3/8"
D = 1 1/8"
A = 1.0"
B = 1 1/8"
E = 13/64"

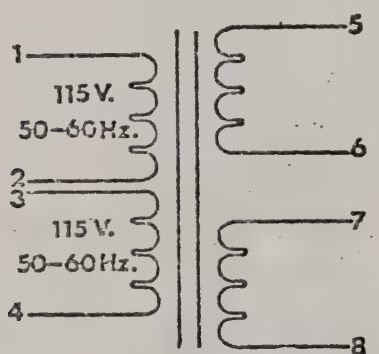
PARALLEL
connect 5 & 7, 6 & 8
use 5 & 6
or
SERIES
connect 6 & 7
use 5 & 8

STANCOR Part No.	STYLE	OUTPUT WATTS	OUTPUT FROM TWO SECONDARY WINDINGS			WT. Lbs.
			INDIVIDUALLY	PARALLEL	SERIES	
PPC-8	PC	1.5	15V. @ 50MA	15V. @ 100MA	30V.CT. @ 50MA	.22

(OVER)







DIMENSIONS

All Tolerances on Dimensions are ± 1/32" except A = ± 1/16"; W = ± 1/16"; and MW = ± 1/16".

H = 1 7/16"
W = 2 3/8"
D = 1 1/4"
MW = 2"
A = 1 1/8"
B = 1 3/8"
C = 1 23/32"
E = 9/32"

PARALLEL
connect 5 & 7, 6 & 8
use 5 & 6
or
SERIES
connect 6 & 7
use 5 & 8

STANCOR Part No.	STYLE	OUTPUT WATTS	OUTPUT FROM TWO SECONDARY WINDINGS			WT. Lbs.
			INDIVIDUALLY	PARALLEL	SERIES	
PPC-18	APC	4.5	6.3V. @ 350MA	6.3V. @ 700MA	12.6V.CT. @ 350MA	.47
PPC-19	APC	4.5	8V. @ 280MA	8V. @ 560MA	16V.CT. @ 280MA	.47
PPC-20	APC	4.5	12V. @ 180MA	12V. @ 360MA	24V.CT. @ 180MA	.47
PPC-28	APC	4.5	10V. @ 225MA	10V. @ 450MA	20V.CT. @ 225MA	.47
PPC-29	APC	4.5	115V. @ 20MA	115V. @ 40MA	230V.CT. @ 20MA	.47

STANCOR

3501 W. ADDISON ST. CHICAGO, ILL. 60618

part no. P-6375 P-6376 P-6377

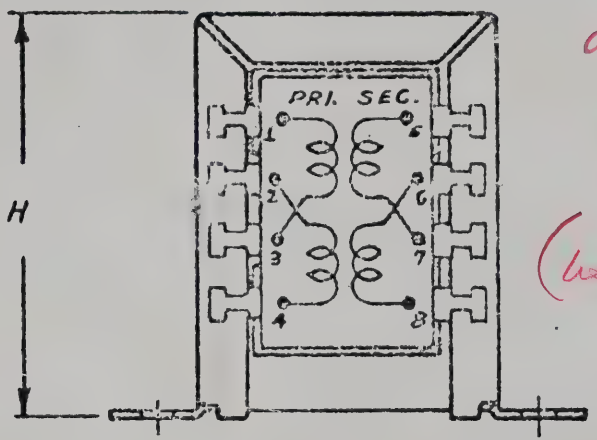
type Control Transformers

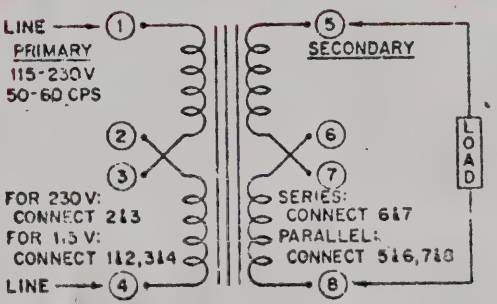
date 5-15-69

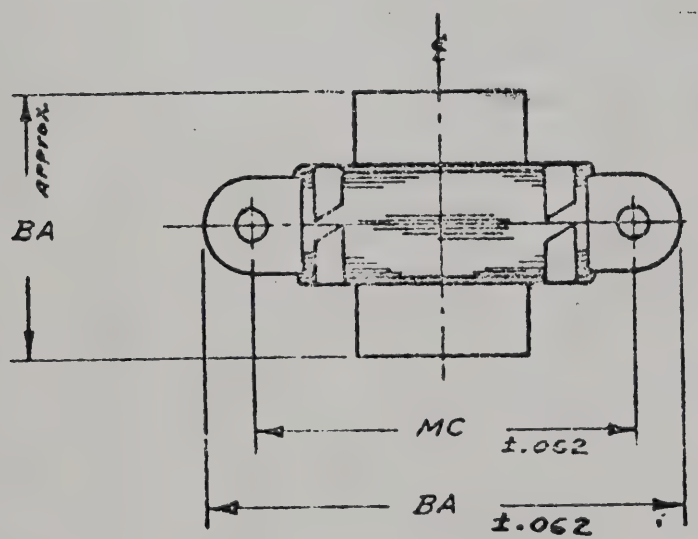
s.d.s. no. 6-1069

SERVICE DATA SHEET

X formers in this box are similar to P6377 (used for CLS/101361)







Stancor Part No.	Primary	Secondary		VA Rating	Mtg. Type	Mtg. Ctrs.	Shpg. Wt. in Lbs.	Height Overall	Base Area
		Parallel	Series						
P-6375		6V @ 2A	12V @ 1A	12	J	2⅜"	1	2⅜"	2⅞" x 1¾"
P-6376	115V/230V	6V @ 4A	12V @ 2A	24	J	2 13/16"	1½	3⅜"	3⅛" x 2"
P-6377	50/60 CPS	12V @ 4A	24V @ 2A	48	J	3⅛"	2½	3⅛"	3⅜" x 2⅜"

on all

GenRad

W2, W5, W5H, W5L, W8, and W8L GANGED VARIAC® autotransformers

with DURATRAK® contact surface

These instructions should be used in conjunction with instructions for corresponding individual models.

The use of two or more Variac autotransformers on a common shaft presents several possibilities:

1. The simultaneous control of two, or more, electrically independent circuits.
2. The control of polyphase circuits, either two- or three-phase.
3. The control of voltages or currents beyond the rating of single units.

Series W Variac autotransformers are available in standard two- and three-gang assemblies. The type number suffix G2 or G3 signifies a two- or three-gang Variac assembly. Type numbers terminating in the suffix M indicate totally enclosed units with knockout facilities for wiring.

The Operating Instructions, for the particular type used, apply to individual units of ganged assemblies, and should be observed. The following special instructions apply to ganged units:

INSTALLATION AND MOUNTING. Ganged Series W models are designed primarily for back-of-panel mounting. Where the panel is strong enough to withstand the bending moment of the cantilevered gang structure, direct panel mounting is recommended, as the gangs themselves are adequately sturdy. However, duplicate mounting facilities at both ends of the gang, and brackets adaptable to either open or cased models, permit shelf mounting, combination shelf and panel mounting, or even table mounting, should this prove desirable. Figure 5 details these mounting options, and gives complete dimensions. For direct panel mounting, the four-hole mounting is strongly recommended as combining greatest strength with freedom from interference between mounting screws and dial plate. When cased models are installed, the two channel sections that comprise the enclosure between the ends should be so installed that removal of the top channel provides ready access to terminals and brushes. This is particularly important if the gang is installed close to a side wall or partition. The long side of the top channel should be installed on the side away from such interference.

The reversible dial plate may be mounted either on the panel or knob. For panel mounting, use the side with clockwise increasing numbers; for knob mounting, the counterclockwise numbers are indicated. This procedure ensures clockwise rotation to increase voltage. Because ganged models are subject to differing voltage maxima, dependent upon the circuit used, dials are calibrated arbitrarily from 0 through 10, to avoid confusion between the several voltage ratings.

Wiring diagrams are detailed in Figures 1, 2, and 3. Remember that the individual units of a ganged assembly must be operated within the single-unit ratings. If there is any doubt on this score, a quick check with an ammeter in the brush output lead and a voltmeter across the winding is the safest procedure to determine if units are being operated within limits. Permissible currents and voltages for the various connections are clearly indicated in Tables I and II.

Single-Phase Circuits

When Variac autotransformers are operated in series, they can be used on circuits whose voltages are twice the normal voltage ranges of the autotransformers. This circuit is particularly useful on 480-volt, single-phase supply, which would otherwise require auxiliary transformers for control. Ratings and other data are listed in Table I below.

Because there is no common connection between input and output with the series connection, DO NOT GROUND LOAD.

TABLE I SINGLE-PHASE ASSEMBLIES

SERVICE	TYPE	WIRING	SEE FIGURE	LINE INPUT VOLTS	OUTPUT*							
					KVA AT		VOLT. RANGE		AMPERES		MINIMUM LOAD OHMS AT	
					LINE VOLTS	MAX VOLTS	LINE	MAX	RATED	MAX	LINE VOLTS	MAX VOLTS
120-VOLT	W2	Single		120	0.37	0.34	0-120	0-140	2.4	3.1	39	58
	W5	Single		120	0.94	0.84	0-120	0-140	6	7.8	15.4	23.3
	W5L	Single		120	1.32	——	0-120	——	8.5	11	10.9	——
	W8	Single		120	1.32	1.19	0-120	0-140	8.5	11	10.9	16.5
	W8L	Single		120	1.56	——	0-120	——	10	13	9.3	——
120- TO 240-VOLT	W5H	Single		120		0.28	——	0-280	1		——	280
240-VOLT	W2G2	Series	1a, 1b	240	0.74	0.67	0-240	0-280	2.4	3.1	78	116
	W5H	Single	——	240	0.62	0.56	0-240	0-280	2	2.6	93	140
	W5G2	Series	1a, 1b	240	1.87	1.68	0-240	0-280	6	7.8	31	47
	W5LG2	Series	1a	240	2.64	——	0-240	——	8.5	11	21.8	——
	W8G2	Series	1a, 1b	240	2.64	2.38	0-240	0-280	8.5	11	21.8	33
	W8LG2	Series	1a	240	3.12	——	0-240	——	10	13	18.5	——
240- TO 480-VOLT	W5HG2	Series	1c	240	0.62	0.56	——	0-560	2	2.6	——	560
480-VOLT	W5HG2	Series	1a, 1b	480	1.25	1.12	0-480	0-560	2	2.6	185	280

*Current and power ratings for Types W5HG2 and W5HG3 also apply to Types W5HG2M and W5HG3M; ratings for other M (cased) models are 17% less than those given for the uncased models.

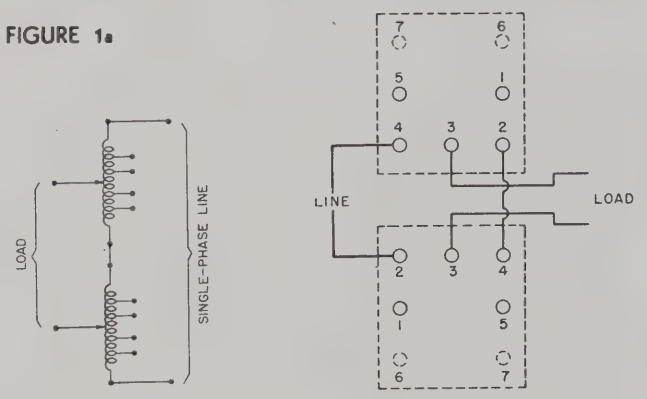
Units connected in open delta and wye circuits can be used directly on three-phase lines. The open-delta connection of Figure 2a normally permits operation either to line voltage or to 117% of line voltage. With the H-models, output voltages of more than double the supply voltage can be obtained, although current and power ratings are halved.

Figure 3 shows one of the most useful connections. Because the voltage across each leg of a wye-connected assembly is line volts divided by $\sqrt{3}$, and since 120-volt units are wound to 140 volts, and 240-volt units to 280 volts, it is possible to operate wye-connected assemblies from three-phase lines of twice the voltage rating of the unit. With this connection,

TABLE II THREE-PHASE ASSEMBLIES

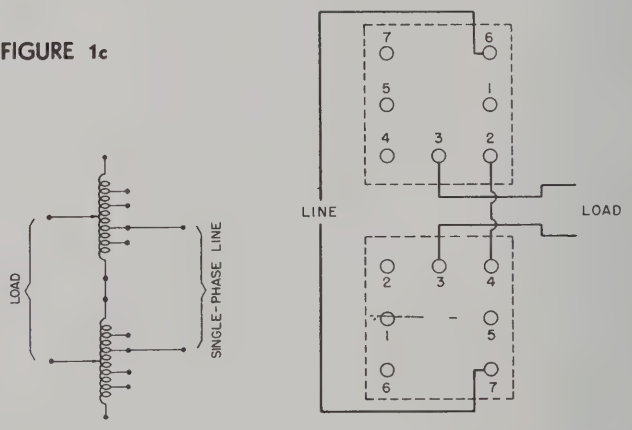
		INPUT			OUTPUT*										
							DELTA LOAD						WYE		
					KVA AT		VOLTAGE RANGE		AMPERES		MINIMUM OHMS		VOLTAGE RANGE		AM
SERVICE	TYPE	LINE VOLTS	WIRING	SEE FIGURE	LINE VOLTAGE	MAX VOLTAGE	LINE	MAX	RATED	MAX	AT LINE VOLTS	AT MAX VOLTS	LINE	MAX	RATI
120-VOLT	W2G2	120	Delta	2a, 2b	0.64	0.59	0-120	0-140	1.39	1.8	67	101	0-69.3	0-81	2.
	W5G2	120	Delta	2a, 2b	1.63	1.45	0-120	0-140	3.47	4.5	26.7	40.4	0-69.3	0-81	6
	W5LG2	120	Delta	2a	2.28	—	0-120	—	4.9	6.35	18.9	—	0-69.3	—	8.
	W8G2	120	Delta	2a, 2b	2.28	2.06	0-120	0-140	4.9	6.35	18.9	28.6	0-69.3	0-81	8.
	W8LG2	120	Delta	2a	2.70	—	0-120	—	5.75	7.52	16.0	—	0-69.3	—	10
120- TO 240-VOLT	W5HG2	120	Delta	2c	0.54	0.49	—	0-280	0.575	1.5	—	487	—	0-162	1
208-VOLT	W2G3	208	Wye	3a, 3b	1.15	1.00	0-208	0-242	1.33	1.8	116	174	0-120	0-140	2.
	W5G3	208	Wye	3a, 3b	2.81	2.50	0-208	0-242	3.47	4.5	46.3	70	0-120	0-140	6
	W5HG2	208	Delta	2a, 2b	0.94	0.84	0-208	0-242	1.15	1.5	139	210	0-120	0-140	2
	W5LG3	208	Wye	3a	3.96	—	0-208	—	4.9	6.35	32.8	—	0-120	—	8.
	W8G3	208	Wye	3a, 3b	3.96	3.57	0-208	0-242	4.9	6.35	32.8	49.5	0-120	0-140	8.
	W8LG3	208	Wye	3a	—	—	0-208	—	5.75	7.52	27.7	—	0-120	—	10
240-VOLT	W2G3	240	Wye	3a	1.33	—	0-240	—	1.39	1.8	133	—	0-139	—	2.
	W5G3	240	Wye	3a	3.24	—	0-240	—	3.47	4.5	53.3	—	0-139	—	6
	W5HG2	240	Delta	2a, 2b	1.08	0.98	0-240	0-280	1.15	1.5	160	243	0-139	0-161	2
208- TO 480-VOLT	W5HG3	208	Wye	3c	0.94	0.84	—	0-485	0.575	1.5	—	840	—	0-280	1
480-VOLT	W5HG3	480	Wye	3a	2.16	—	0-480	—	1.15	1.5	320	—	0-276	—	2

FIGURE 1a



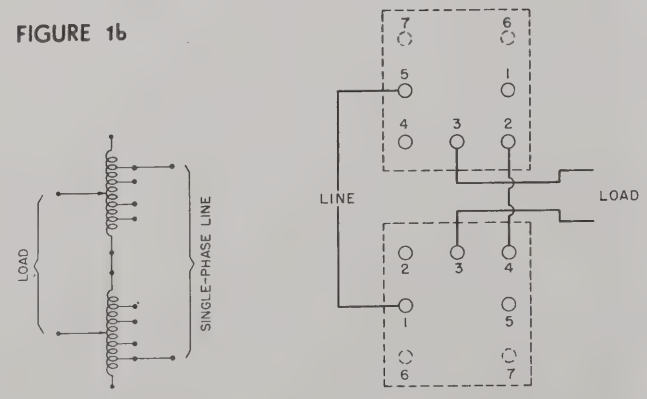
G2 Assemblies: 240 volts 50-60 c/s in 0-240 volts out
HG2 Assemblies: 480 volts 50-60 c/s in 0-480 volts out

FIGURE 1c



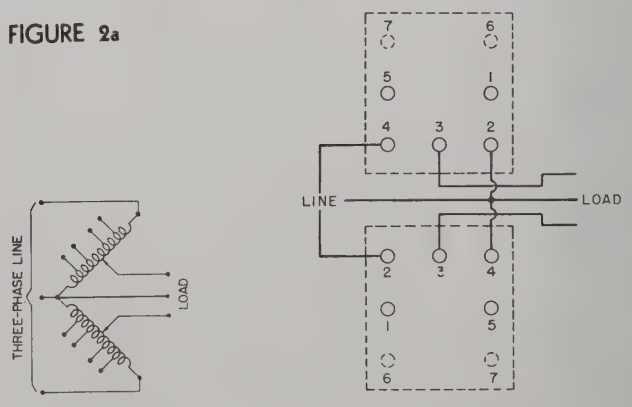
HG2 Assemblies: 120 volts 50-60 c/s in 0-280 volts out
240 volts 50-60 c/s in 0-560 volts out

FIGURE 1b



G2 Assemblies: 240 volts 50-60 c/s in 0-280 volts out
HG2 Assemblies: 480 volts 50-60 c/s in 0-560 volts out

FIGURE 2a



G2 Assemblies: 120 volts 50-60 c/s in 0-120 volts out
HG2 Assemblies: 240 volts 50-60 c/s in 0-240 volts out

the voltage across the assembly on a 480-volt line is 277 volts; across a 240-volt line it is 138 volts. The overvoltage feature is sacrificed in this circuit, but KVA rating is increased by the ratio of 138:120.

The two common types of three-phase loads are shown in Figure 4. For equal loads on the supply units, $R_\Delta = 3R_Y$: The relation of R_Δ and R_Y to the single-phase impedance, R, is given by $\frac{R_\Delta}{\sqrt{3}} = R = R_Y\sqrt{3}$.

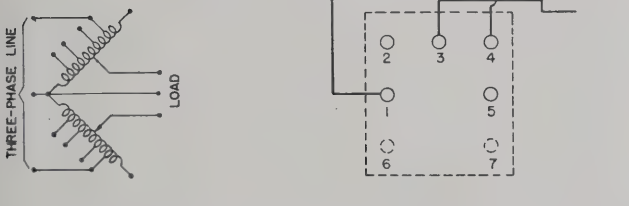
Voltages and circuits as well as minimum load impedances are given in Table II below. Note that $V_\Delta = V_Y\sqrt{3}$ and $I_\Delta = \frac{I_Y}{\sqrt{3}}$.

D		
ES	MINIMUM OHMS	
AX	AT LINE VOLTS	AT MAX VOLTS
3.1	22.4	33.7
7.8	8.9	13.5
1	6.3	—
1	6.3	9.5
3	5.3	—
2.6	—	162
3.1	39.4	58.3
7.8	15.4	23.3
2.6	46.2	70
1	10.9	—
1	10.9	16.5
3	9.25	—
3.1	44.8	—
7.8	17.8	—
2.6	53.5	80.5
2.6	—	280
2.6	106	—

NOTE: On each ganged assembly, one unit is reversed to provide protection by having a base at each end of the assembly. This is indicated in the accompanying figures by the relative position of the numbered terminals. Since all units are symmetrically tapped, the terminals on the reversed unit are numerically interchanged, as is plainly indicated on the diagrams.

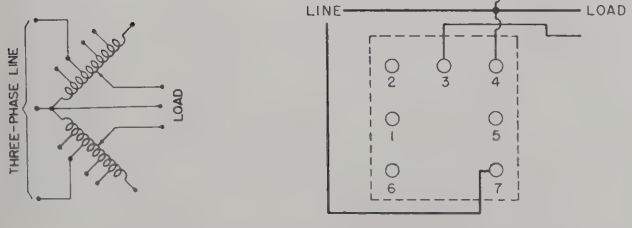
*Current and power ratings for Types W5H and W5HG2 also apply to Types W5HM and W5HG2M; ratings for other M (cased) models are 17% less than those given for the uncased models.

FIGURE 2b



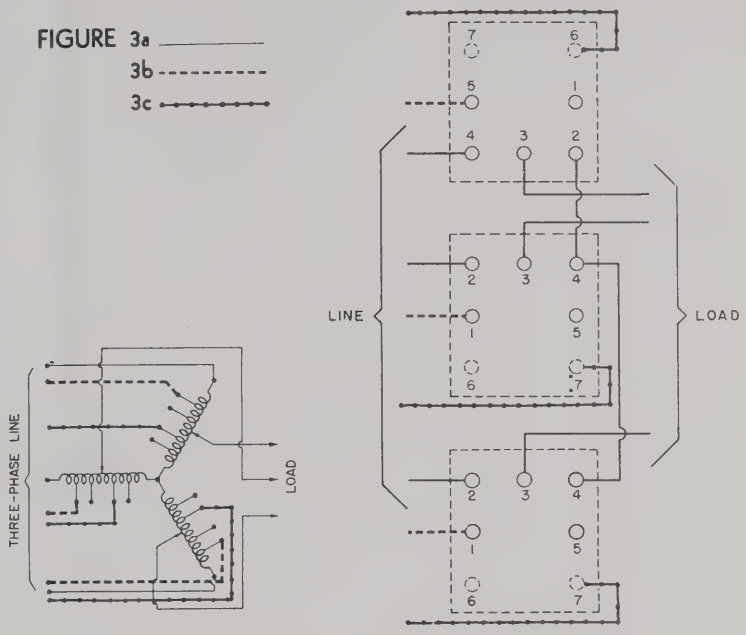
G2 Assemblies: 120 volts 50-60 c/s in 0-140 volts out
HG2 Assemblies: 240 volts 50-60 c/s in 0-280 volts out

FIGURE 2c



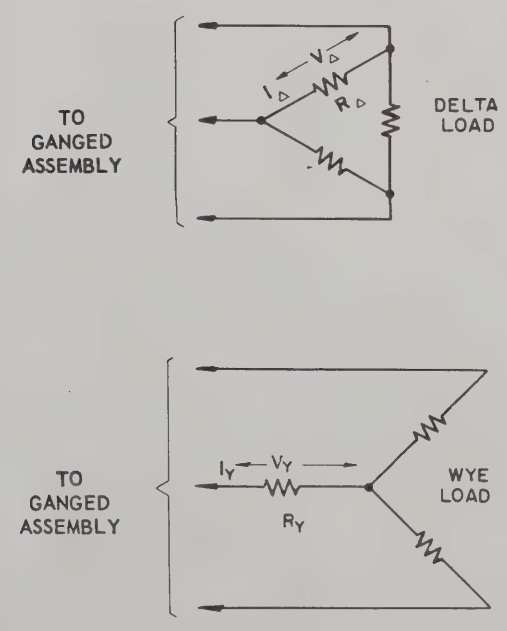
HG2 Assemblies: 120 volts 50-60 c/s in 0-280 volts out

FIGURE 3a
3b
3c



G3 Assemblies: 240 volts 50-60 c/s in 0-240 volts out
HG3 Assemblies: 480 volts 50-60 c/s in 0-480 volts out

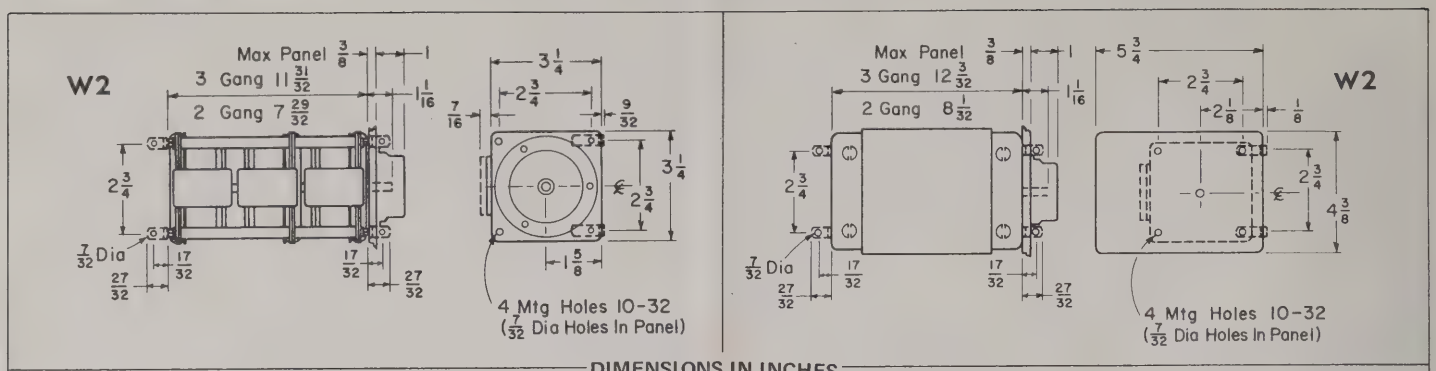
FIGURE 4



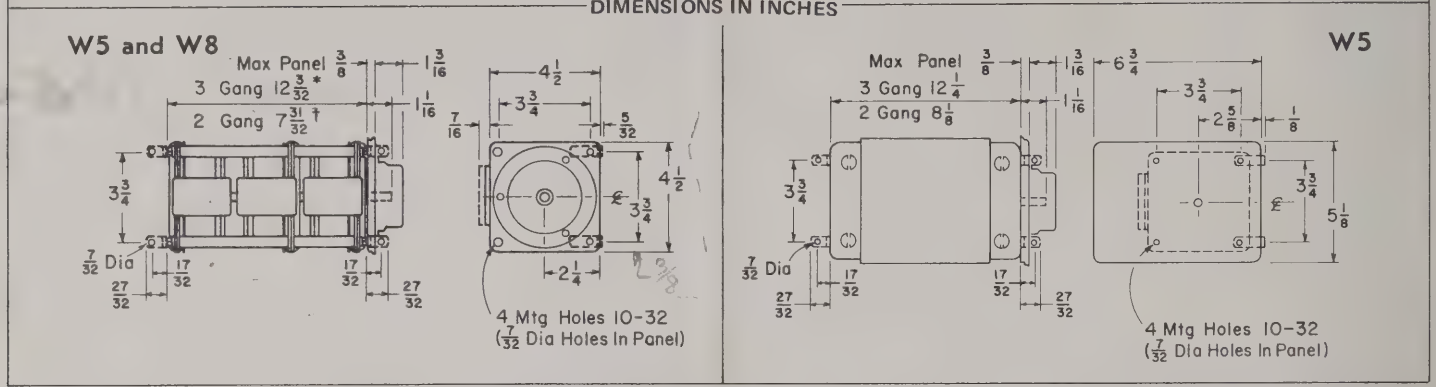
Uncased Ganged Assembly

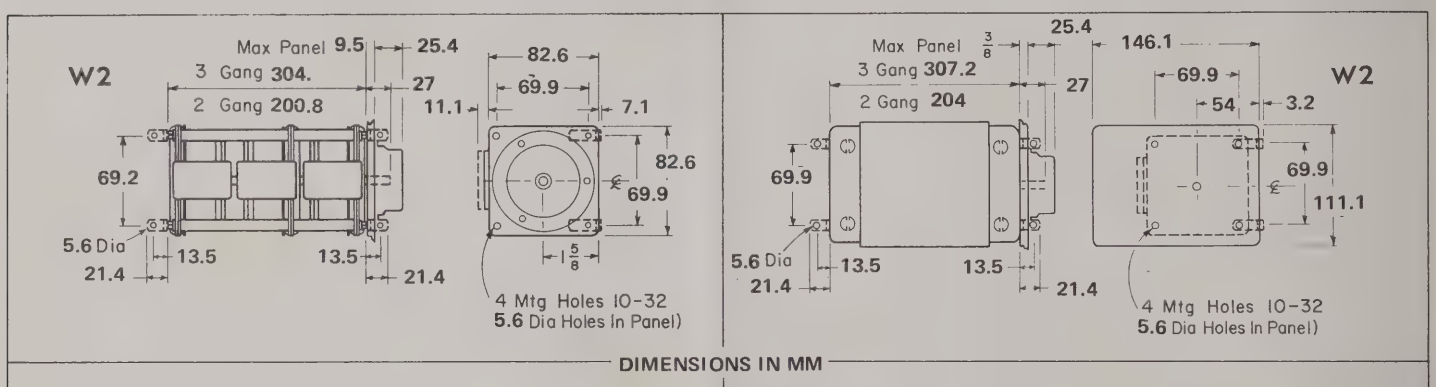
Figure 5. DIMENSION DRAWINGS.

Cased Ganged Assembly

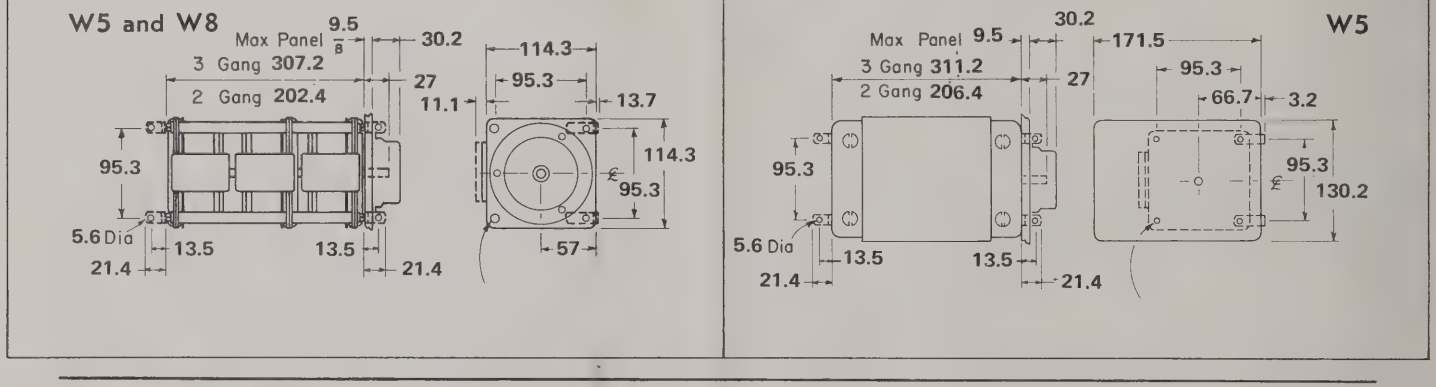


DIMENSIONS IN INCHES





DIMENSIONS IN MM



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MC800 series (0 to +75 and 0 to +100°C)
MC900 series (–55 to +125°C)

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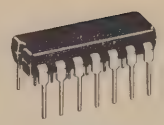
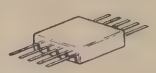
G SUFFIX
METAL PACKAGE
CASE 601

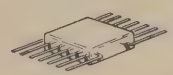
G SUFFIX
METAL PACKAGE
CASE 603
TO-100



P SUFFIX
PLASTIC PACKAGE
CASE 646



F SUFFIX
CERAMIC PACKAGE
CASE 606
TO-91



F SUFFIX
CERAMIC PACKAGE
CASE 607

P SUFFIX
PLASTIC PACKAGE
CASE 648

FUNCTIONS AND CHARACTERISTICS

(V_{CC} = 3.0 V ±10% for MC900 Series and MC800F, G Series; 3.6 V ±10% for MC800P Series and MC700 Series, T_A = 25°C)

Function	Type ① MC700 Series +15 to +55°C	Case	Type ① MC800 Series 0 to +75°C	Case	Type ① MC800 Series 0 to +100°C	Case	Type ① MC900 Series –55 to +125°C	Case	Loading Factor Each Output: With mW MRTL	Loading Factor Each Output: With MRTL	tp ns typ	Power Dissipation mW typ/pkg: MC700 and MC800P Series	Power Dissipation mW typ/pkg: MC800F,G and MC900 Series
Buffer	MC700	601,606			MC800	601,606	MC900	601,606	80	25	20	25/50 ②	16/45 ②
Counter Adapter	MC701	601			MC801	601	MC901	601	16	5	22	80	55
R-S Flip-Flop	MC702	601			MC802	601	MC902	601	13	4	14	32	22
3-Input NOR Gate	MC703	601,606			MC803	601,606	MC903	601,606	16	5	12	28/7.5 ②	19/5.0 ②
Half Adder	MC704	601,606			MC804	601,606	MC904	601,606	16	5	14	65	45
Half-Shift Register	MC705	601,606			MC805	601,606	MC905	601,606	13	4	22	75	53
Half-Shift Register (w/o inverter)	MC706	601,606			MC806	601,606	MC906	601,606	13	4	22	52	36
4-Input NOR Gate	MC707	601,606			MC807	601,606	MC907	601,606	16	5	12	30/7.5 ②	19/5.0 ②
Dual 2-Input NOR Gate	MC714	601,606			MC814	601,606	MC914	601,606	16	5	12	50/15 ②	38/10 ②
Dual 3-Input NOR Gate	MC715	603,606,646	MC815	646	MC815	603,606	MC915	603,606	16	5	12	55/15 ②	38/10 ②
J-K Flip-Flop			MC816	646	MC816	601,606	MC916	601,606	–	3	30	91/79 ③	62/54 ③
J-K Flip-Flop	MC723	601,606,646							10	–	30	91/79 ③	–
Quad 2-Input NOR Gate	MC724,A	607,646	MC824,A	646	MC824	607	MC924	607	16	5	12	100/30 ②	76/20 ②
Dual 4-Input NOR Gate	MC725	607,646	MC825	646	MC825	607	MC925	607	16	5	12	60/15 ②	38/10 ②
J-K Flip-Flop	MC726	603,606,646	MC826	646	MC826	603,606	MC926	603,606	16	5	35	100/86 ③	130/65 ③
Quad Inverter	MC727	603,606			MC827	603,606	MC927	603,606	16	5	12	87/30 ②	76/20 ②
5-Input NOR Gate	MC729	601,606			MC829	603,606	MC929	601,606	16	5	12	33/7.5 ②	19/5.0 ②
Quad Exclusive OR Gate	MC771	607,646	MC871	646	MC871	607	MC971	607	16	5	12	28	72
J-K Flip-Flop	MC774	601			MC874	601	MC974	601	16	5	35	100/86 ③	130/65 ③
Dual Half-Adder	MC775	607,646	MC875	646	MC875	607	MC975	607	16	5	20	120	90
Binary Up Counter	MC777	646	MC877	646					10	3	–	180	–
1 J-K Flip-Flop, 1 Expander, 2 Buffers	MC779	646	MC879	646					–	–	–	141/124 ④	–
Decade Up Counter	MC780	646	MC880	646					10	3	–	250	–
Dual Half-Shift Register	MC783	607,646	MC883	646	MC883	607	MC983	607	13	4	22	140	110
Dual Half-Shift Register (w/inverter)	MC784	607,646	MC884	646	MC884	607	MC984	607	13	4	22	100	75
Quad 2-Input Expander	MC785,A	607,646	MC885,A	646	MC885	607	MC985	607	–	–	12	20/– ②	17/– ②
Dual 4-Input Expander	MC786	607,646	MC886	646	MC886	607	MC986	607	–	–	12	20/– ②	17/– ②
1 J-K Flip-Flop, 1 Inverter, 2 Buffers	MC787	646	MC887	646					–	–	–	138/132 ④	–
Dual 3-Input Buffer, non-inverting	MC788	607,646	MC888	646	MC888	607	MC988	607	80	25	24	145/56 ②	128/42 ②
Hex Inverter	MC789,A	607,646	MC889,A	646	MC889	607	MC989	607	16	5	12	130/15 ②	76/20 ②
Dual J-K Flip-Flop	MC790	607,646	MC890	646	MC890	607	MC990	607	10	3	35	182/158 ③	124/108 ③
Dual J-K Flip-Flop	MC791	607,646	MC891	646	MC891	607	MC991	607	16	5	40	190/160 ③	155/130 ③
Triple 3-Input NOR Gate	MC792	607,646	MC892	646	MC892	607	MC992	607	16	5	12	82/24 ②	57/15 ②
Serial-Parallel Shift Register	MC794	646	MC894	646					16	5	55	225	–
Dual Full Adder	MC796	607,646	MC896	646	MC896	607	MC996	607	16	5	60	225	190
Dual Full Subtractor	MC797	607,646	MC897	646	MC897	607	MC997	607	16	5	60	225	190
Dual Buffer	MC799	603,606,646	MC899	646	MC899	603,606	MC999	603,606	80	25	15	50/90 ②	32/90 ②
Dual 4-Channel Data Selector	MC9701	648	MC9801	648					16	5	25	100	–
Dual J-K Flip-Flop	MC9702	646	MC9802	646					10	3	35	182/158 ③	–
4-Bit Parallel Full Adder	MC9704	648	MC9804	648					6	2	125	265	–
Dual 4-Channel Data Distributor	MC9707	648	MC9807	648					16	5	25	150	–
Quad Schmitt Trigger	MC9709	646	MC9809	646					16	5	30	95	–
Quad 2-Input AND Gate	MC9713	646	MC9813	646					16	5	28	100	–
Quad 2-Input NAND Gate	MC9714	646	MC9814	646					16	5	14 ⑤	145	–
Quad 2-Input OR Gate	MC9715	646	MC9815	646					16	5	14 ⑤	28/100 ②	–
Hex Expander	MC9719,A	646	MC9819,A	646					–	–	12	13/– ②	–

"A" suffix devices have insured capability to drive at least one MTTL load or two MDTL loads.

① G Suffix denotes Metal Can, F suffix denotes Flat Package, P suffix denotes Plastic Package.

② Inputs High/Inputs Low

③ Only Clock Inputs High/Inputs Low

④ Only Clock Input high on flip-flop, other element Inputs High/Inputs Low

⑤ Operating Frequency (MHz)

MOTOROLA Semiconductor Products Inc.

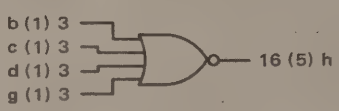
The numbers in parenthesis indicate loading factors for medium-power MRTL devices. The numbers at the end of the terminals indicate the normalized loading factors used for compatability with the low-power mW MRTL devices when mixing the two power levels in a system. Pin numbers vary with the package types. The alpha pin designations shown on the logic diagrams, used in conjunction with the Package Information Table (following the logic diagrams), make it possible to ascertain pin numbers for a specific device and package.

GATES

MC703, MC803, MC903
3-Input NOR Gate

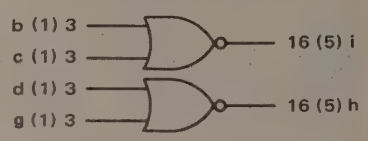
$h = \overline{b + c + d}$

MC707, MC807, MC907
4-Input NOR Gate



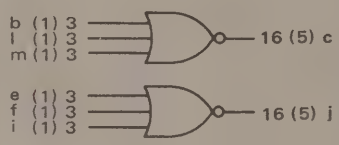
$h = \overline{b + c + d + g}$

MC714, MC814, MC914
Dual 2-Input NOR Gate



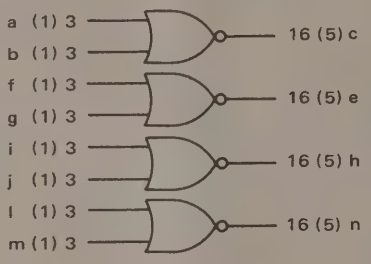
$i = \overline{b + c}$

MC715, MC815, MC915
Dual 3-Input NOR Gate



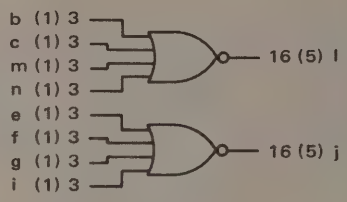
$c = \overline{b + l + m}$

MC724,A, MC824,A, MC924
Quad 2-Input NOR Gate



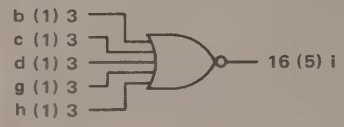
$c = \overline{a + b}$

MC725, MC825, MC925
Dual 4-Input NOR Gate



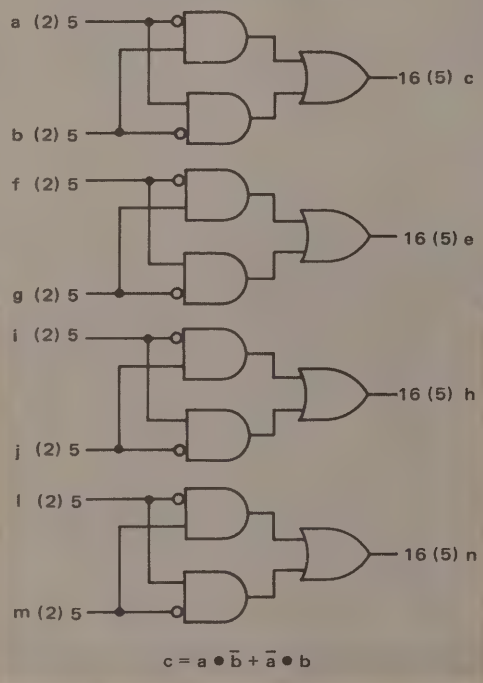
$l = \overline{b + c + m + n}$

MC729, MC829, MC929
5-Input NOR Gate



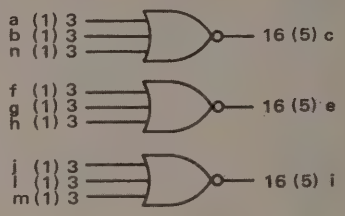
$i = \overline{b + c + d + g + h}$

MC771, MC871, MC971
Quad Exclusive OR Gate



$c = a \bullet \bar{b} + \bar{a} \bullet b$

MC792, MC892, MC992
Triple 3-Input NOR Gate

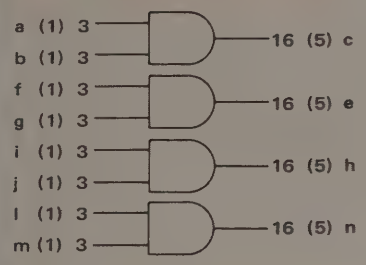


$c = \overline{a + b + d}$

(continued)

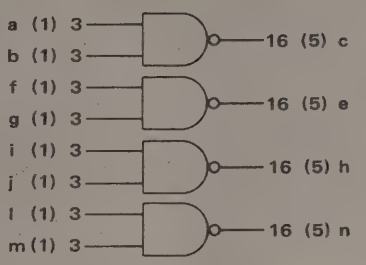
GATES (continued)

MC9713, MC9813
Quad 2-Input AND Gate



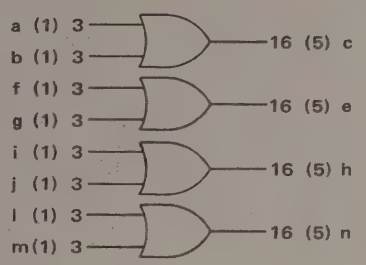
$c = a \bullet b$

MC9714, MC9814
Quad 2-Input NAND Gate



$c = \overline{a \bullet b}$

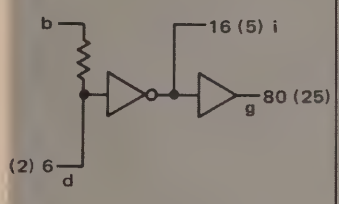
MC9715, MC9815
Quad 2-Input OR Gate



$c = a + b$

BUFFERS

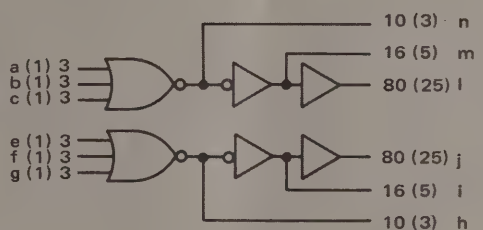
MC700, MC800, MC900
Buffer



$i = \overline{d}$

$g = \overline{d}$

MC788, MC888, MC988
Dual 3-Input Buffer

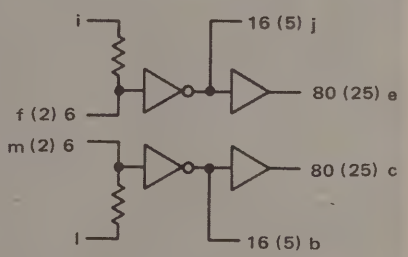


$n = \overline{a + b + c}$

$m = a + b + c$

$l = a + b + c$

MC799, MC899, MC999
Dual Buffer

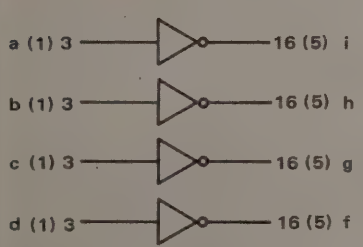


$j = \overline{f}$

$e = \overline{f}$

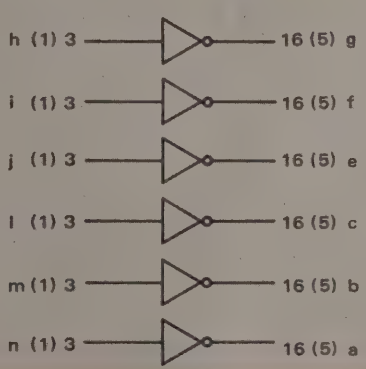
INVERTERS

MC727, MC827, MC927
Quad Inverter



$i = \overline{a}$

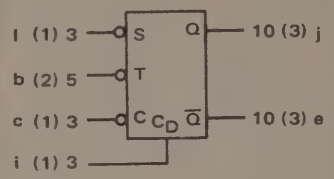
MC789,A, MC889,A, MC989
Hex Inverter



$a = \overline{n}$

FLIP-FLOPS

MC723, MC816, MC916
J-K Flip-Flop

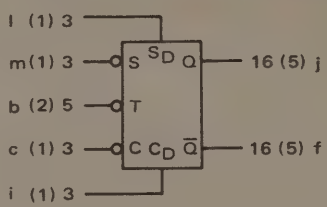


CLOCKED INPUT OPERATION①

t_n②		t_{n+1}②	
S	C	Q	$\bar{Q}$
1	1	Q_n③	$\bar{Q}_n$
1	0	1	0
0	1	0	1
0	0	$\bar{Q}_n$	Q_n③

1. Direct input (C_D) must be low.
2. The time period prior to the negative transition of the clock pulse is denoted t_n and the time period subsequent to this transition is denoted t_{n+1}.
3. Q_n is the state of the Q output in the time period t_n.

MC726, MC826, MC926
J-K Flip-Flop



CLOCKED INPUT OPERATION①

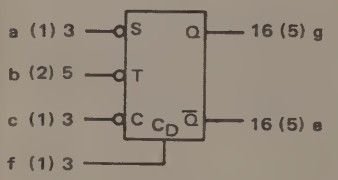
t_n②		t_{n+1}②	
S	C	Q	$\bar{Q}$
1	1	Q_n③	$\bar{Q}_n$
1	0	1	0
0	1	0	1
0	0	$\bar{Q}_n$	Q_n③

DIRECT INPUT OPERATION①

S_D	C_D	Q	$\bar{Q}$
0	0	⑤	⑤
1	0	1	0
0	1	0	1
1	1	1	1

1. Direct inputs (C_D and S_D) must be low.
2. The time period prior to the negative transition of the clock pulse is denoted t_n and the time period subsequent to this transition is denoted t_{n+1}.
3. Q_n is the state of the Q output in the time period t_n.
4. Clock (T) to remain unchanged.
5. The output state will not change when the input state goes from $S_D = \bar{C}_D$ to $S_D = C_D = 0$. The output state cannot be predetermined in the case where the input goes from $S_D = C_D = 1$ to $S_D = C_D = 0$.

MC774, MC874, MC974
J-K Flip-Flop

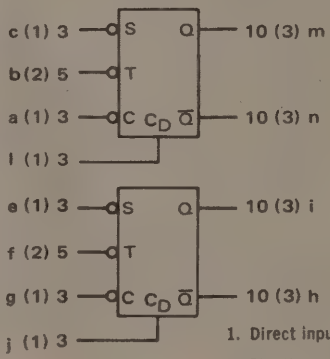


CLOCKED INPUT OPERATION①

t_n②		t_{n+1}②	
S	C	Q	$\bar{Q}$
1	1	Q_n③	$\bar{Q}_n$
1	0	1	0
0	1	0	1
0	0	$\bar{Q}_n$	Q_n③

1. Direct input (C_D) must be low.
2. The time period prior to the negative transition of the clock pulse is denoted t_n and the time period subsequent to this transition is denoted t_{n+1}.
3. Q_n is the state of the Q output in the time period t_n.

MC790, MC890, MC990
Dual J-K Flip-Flop



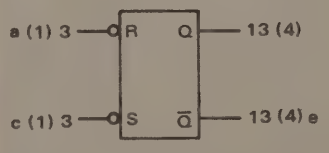
CLOCKED INPUT OPERATION① (each Flip-Flop)

t_n②		t_{n+1}②	
S	C	Q	$\bar{Q}$
1	1	Q_n③	$\bar{Q}_n$
1	0	1	0
0	1	0	1
0	0	$\bar{Q}_n$	Q_n③

1. Direct input (C_D) must be low.
2. The time period prior to the negative transition of the clock pulse is denoted t_n and the time period subsequent to this transition is denoted t_{n+1}.
3. Q_n is the state of the Q output in the time period t_n.

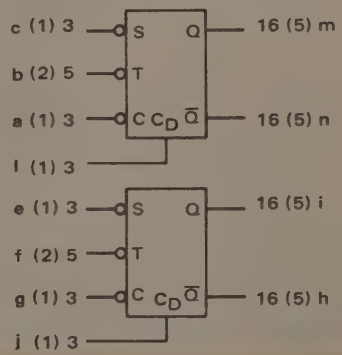
NOTE:
Clock pulse fall time must be within the range of 10 ns to 100 ns on all J-K Flip-Flops except MC926, MC826F, and MC826G which have a range of 10 ns to 200 ns.

MC702, MC802, MC902
R-S Flip-Flop



R	S	Q_{n+1}
0	0	Q_n
0	1	1
1	0	0
1	1	0

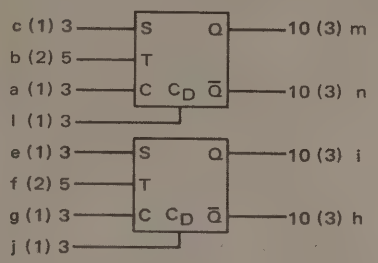
MC791, MC891, MC991
Dual J-K Flip-Flop



(continued)

FLIP-FLOPS (continued)

MC9702, MC9802
Dual J-K Flip-Flop



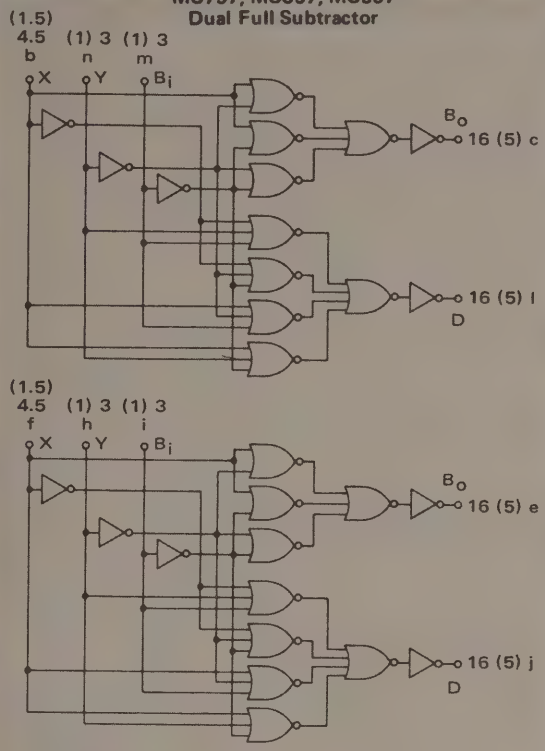
CLOCKED INPUT OPERATION ①

t_n ②		t_{n+1} ②	
S	C	Q	$\overline{Q}$
1	1	Q_n ③	$\overline{Q}_n$
1	0	1	0
0	1	0	1
0	0	$\overline{Q}_n$	Q_n ③

1. Preclear input (C_D) must be low.
2. The time period prior to the negative transition of the clock pulse is denoted t_n and the time period subsequent to this transition is denoted t_{n+1}.
3. Q_n is the state of the Q output in the time period t_n.
4. Clock pulse fall time must be <100 ns.

FULL SUBTRACTOR

MC797, MC897, MC997
Dual Full Subtractor

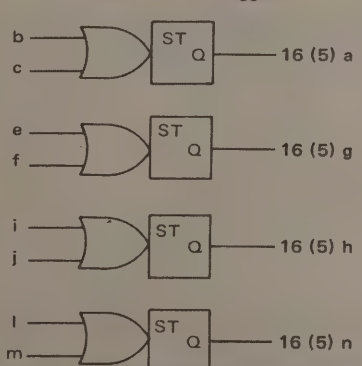


TRUTH TABLE				
Input Logic Level			Output Logic Level	
X	Y	B_i	D	B_o
0	0	0	0	0
0	0	1	1	1
0	1	0	1	1
0	1	1	0	1
1	0	0	1	0
1	0	1	0	0
1	1	0	0	0
1	1	1	1	1

$$D = YX\overline{B}_i + \overline{Y}X\overline{B}_i + Y\overline{X}\overline{B}_i + \overline{Y}\overline{X}B_i$$
$$B_o = \overline{Y}\overline{X}B_i + \overline{Y}X\overline{B}_i + Y\overline{X}B_i + YXB_i$$

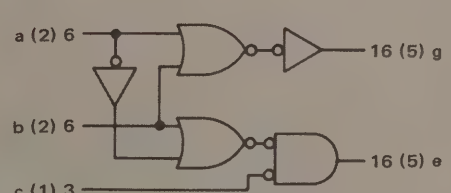
SCHMITT TRIGGER

MC9709, MC9809
Quad Schmitt Trigger



COUNTER ADAPTER

MC701, MC801, MC901
Counter Adapter

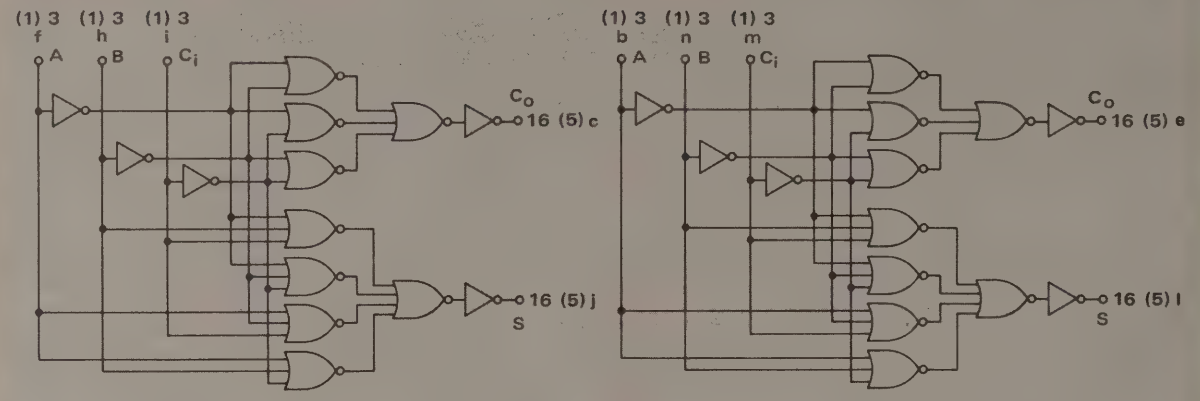


$$g = a + b$$
$$e = (\overline{a} + b)\,\overline{c}$$

MRTL LOGIC DIAGRAMS

FULL ADDERS

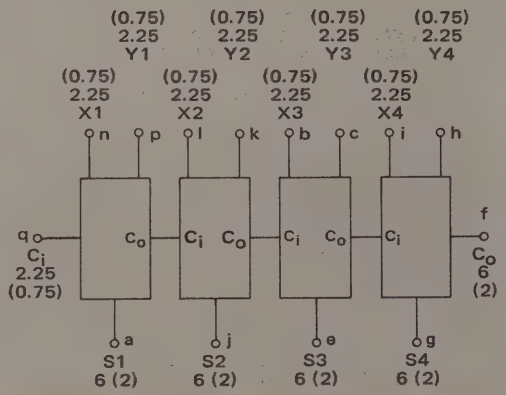
MC796, MC896, MC996
Dual Full Adder



$C_o = ABC_i + AB\bar{C}_i + A\bar{B}C_i + \bar{A}BC_i$

$S = ABC_i + AB\bar{C}_i + A\bar{B}\bar{C}_i + \bar{A}BC_i$

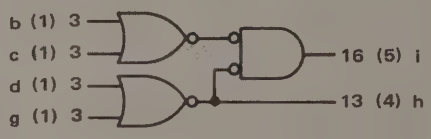
MC9704, MC9804
4-Bit Parallel Full Adder



TRUTH TABLE				
Input Logic Level			Output Logic Level	
A	B	C_i	S	C_o
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1

HALF ADDERS

MC704, MC804, MC904
Half Adder



$i = (b + c)\ (d + g)$

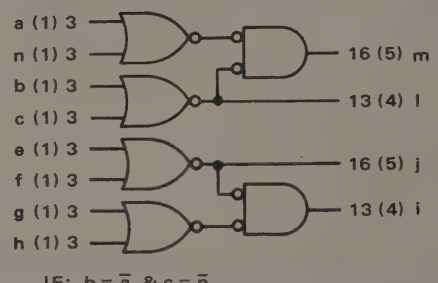
$h = \overline{d + g}$

IF: $d = \bar{b}$, & $g = \bar{c}$

THEN: $h = b \bullet c$

$i = b \bullet \bar{c} + \bar{b} \bullet c$

MC775, MC875, MC975
Dual Half Adder

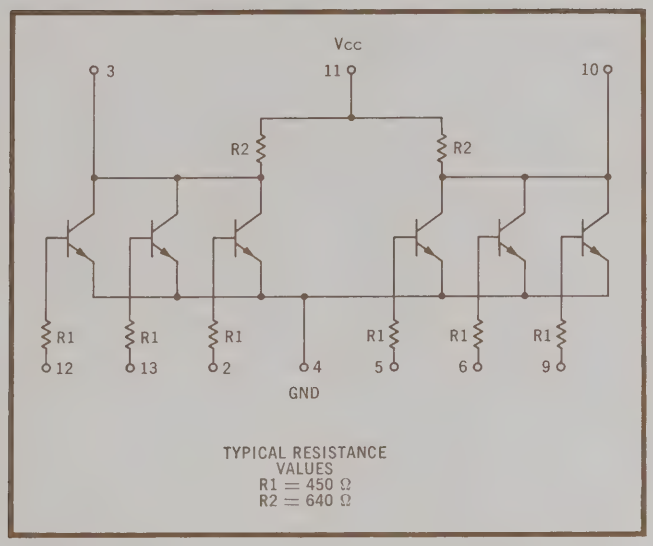


IF: $b = \bar{a}$, & $c = \bar{n}$

THEN: $l = a \bullet n$, & $m = a \bullet \bar{n} + \bar{a} \bullet n$

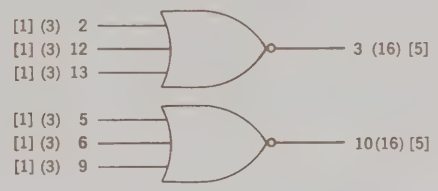
MC715P • MC815P

ISSUE A



TYPICAL RESISTANCE VALUES
R1 = 450 Ω
R2 = 640 Ω

A monolithic device consisting of two 3-input positive logic NOR gates. Each may be used independently, paralleled for increasing the number of inputs (subject to loading rules), or cross-coupled to form bistable elements.



$3 = \overline{2 + 12 + 13}$

NUMBER IN PARENTHESIS INDICATES mW MRTL LOADING FACTOR

NUMBER IN BRACKETS INDICATES LOADING FACTOR

t_{pd} = 12 ns
P_D = 55 mW (Input High)
15 mW (Inputs Low)

ELECTRICAL CHARACTERISTICS

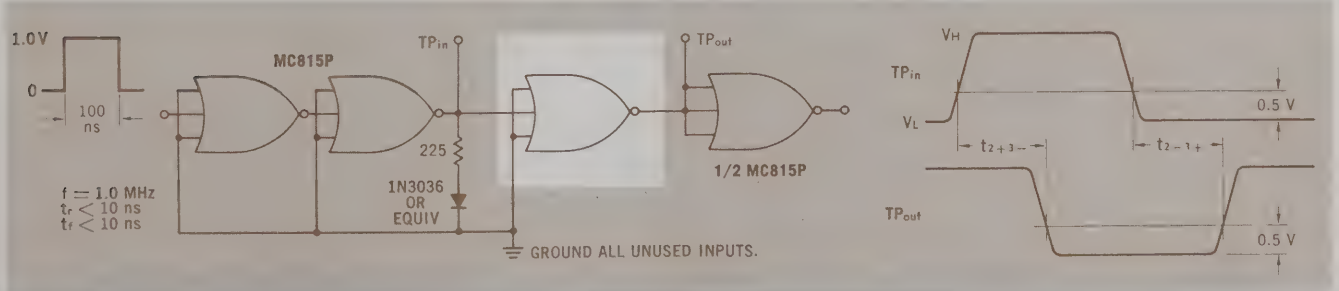
TEST PROCEDURES ARE SHOWN FOR ONE GATE ONLY
THE OTHER GATE IS TESTED IN THE SAME MANNER.

	@ Test Temperature	TEST VOLTAGE VALUES (Volts) V_{in}	V_{on}	V_{BOT}	V_{off}	V_{CC}
MC815P	0°C	0.960	0.930	1.80	0.570	3.60
	+25°C	0.910	0.880	1.80	0.500	3.60
	+75°C	0.820	0.790	1.80	0.450	3.60
MC715P	+15°C	0.865	0.865	1.80	0.475	3.60
	+25°C	0.850	0.850	1.80	0.460	3.60
	+55°C	0.800	0.800	1.80	0.430	3.60

Characteristic	Symbol	Pin Under Test	MC815P Test Limits 0°C Min	0°C Max	+25°C Min	+25°C Max	+75°C Min	+75°C Max	Unit	MC715P Test Limits +15°C Min	+15°C Max	+25°C Min	+25°C Max	+55°C Min	+55°C Max	Unit	TEST VOLTAGE APPLIED TO PINS LISTED BELOW: V_{in}	V_{on}	V_{BOT}	V_{off}	V_{CC}	Gnd
Input Current	I_{in}	2	-	600	-	600	-	570	μAdc	-	500	-	500	-	470	μAdc	2	-	12, 13	-	11	4
		12	-	↓	-	↓	-	↓	↓	-	↓	-	↓	-	↓	↓	12	-	2, 13	-	↓	↓
		13	-	↓	-	↓	-	↓	↓	-	↓	-	↓	-	↓	↓	13	-	2, 12	-	↓	↓
Output Current	I_{A5}	3	3.00	-	3.00	-	2.85	-	mAdc	2.65	-	2.65	-	2.50	-	mAdc	-	3	-	2, 12, 13	11	4
Output Voltage	V_{out}	3	-	500	-	400	-	400	mVdc	-	400	-	300	-	320	mVdc	-	12	-	-	11	2, 4, 13
		3	-	↓	-	↓	-	↓	↓	-	↓	-	↓	-	↓	↓	-	13	-	-	↓	2, 4, 12
		3	-	↓	-	↓	-	↓	↓	-	↓	-	↓	-	↓	↓	-	2	-	-	↓	4, 12, 13
Saturation Voltage	$V_{CE(sat)}$	3	-	400	-	300	-	350	mVdc	-	300	-	290	-	320	mVdc	-	-	12	-	11	2, 4, 13
		3	-	↓	-	↓	-	↓	↓	-	↓	-	↓	-	↓	↓	-	-	13	-	↓	2, 4, 12
		3	-	↓	-	↓	-	↓	↓	-	↓	-	↓	-	↓	↓	-	-	2	-	↓	4, 12, 13
Switching Time	t_{on} - t_{off}	3, 13	-	-	-	48	-	-	ns	-	-	-	48	-	-	ns	Pulse In 13	Pulse Out 3	-	-	11	2, 4, 12

Ground input pins of gate not under test. Other pins not listed are left open.

SWITCHING TIMES TEST CIRCUIT AND WAVEFORMS



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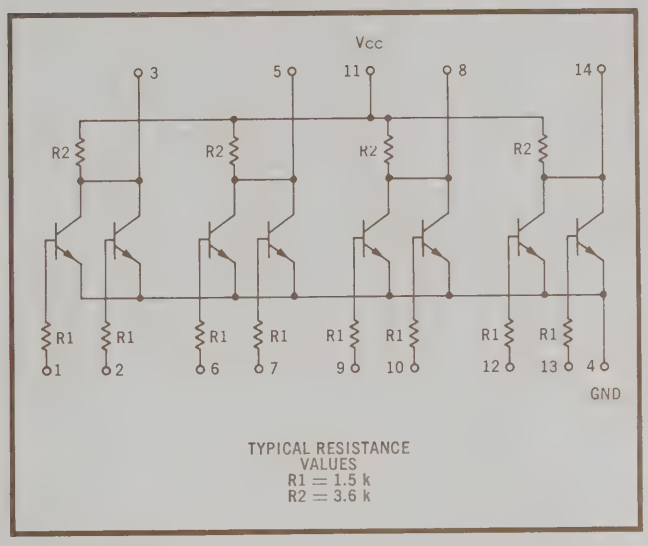
3001-37 PRINTED IN USA 6-74 IMPERIAL LITHO 844558 3500

DS-9081

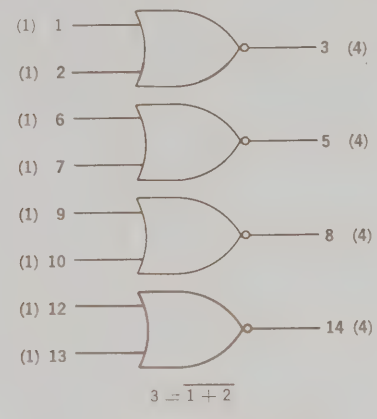
MC717P • MC817P

ISSUE A



TYPICAL RESISTANCE VALUES
R1 = 1.5 k
R2 = 3.6 k

A monolithic device consisting of four 2-input positive logic NOR gates. Each may be used independently, paralleled for increasing the number of inputs (subject to loading rules), or cross-coupled to form bistable elements.



NUMBER IN PARENTHESIS INDICATES mW MRTL LOADING FACTOR

t_{pd} = 27 ns
P_D = 20 mW (Input High)
5.0 mW (Inputs Low)

ELECTRICAL CHARACTERISTICS

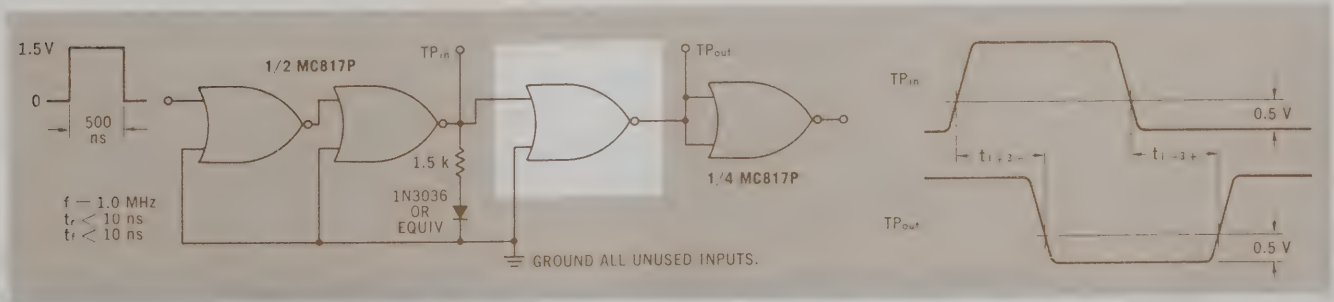
TEST PROCEDURES ARE SHOWN FOR ONE GATE ONLY. THE OTHER GATES ARE TESTED IN THE SAME MANNER.

	@ Test Temperature	TEST VOLTAGE VALUES (Volts) V_{in}	V_{on}	V_{BOT}	V_{off}	V_{CC}
MC817P	0°C	0.680	0.850	1.80	0.500	3.60
	+25°C	0.830	0.800	1.80	0.460	3.60
	+75°C	0.740	0.710	1.80	0.400	3.60
MC717P	+15°C	0.865	0.865	1.80	0.475	3.60
	+25°C	0.850	0.850	1.80	0.460	3.60
	+55°C	0.800	0.800	1.80	0.430	3.60

Characteristic	Symbol	Pin Under Test	MC817P Test Limits 0°C Min	0°C Max	+25°C Min	+25°C Max	+75°C Min	+75°C Max	Unit	MC717P Test Limits +15°C Min	+15°C Max	+25°C Min	+25°C Max	+55°C Min	+55°C Max	Unit	TEST VOLTAGE APPLIED TO PINS LISTED BELOW: V_{in}	V_{on}	V_{BOT}	V_{off}	V_{CC}	Gnd
Input Current	I_{in}	1	-	150	-	140	-	140	μAdc	-	150	-	150	-	150	μAdc	1	-	2	-	11	4
		2	-	150	-	140	-	140	μAdc	-	150	-	150	-	150	μAdc	2	-	1	-	11	4
Output Current	I_{A4}	3	570	-	570	-	535	-	μAdc	570	-	570	-	570	-	μAdc	-	3	-	1.2	11	4
Output Voltage	V_{out}	3	-	400	-	350	-	300	mVdc	-	400	-	300	-	320	mVdc	-	1	-	-	11	2, 4
		3	-	400	-	350	-	300	mVdc	-	400	-	300	-	320	mVdc	-	2	-	-	11	1, 4
Saturation Voltage	$V_{CE(sat)}$	3	-	250	-	250	-	250	mVdc	-	220	-	230	-	320	mVdc	-	-	1	-	11	2, 4
		3	-	250	-	250	-	250	mVdc	-	220	-	230	-	320	mVdc	-	-	2	-	11	1, 4
Switching Time	$t_{on} + t_{off}$	1, 3	-	-	-	90	-	-	ns	-	-	-	90	-	-	ns	Pulse In 1	Pulse Out 3	-	-	11	2, 4

Ground input pins of gates not under test. Other pins not listed are left open.

SWITCHING TIMES TEST CIRCUIT AND WAVEFORMS



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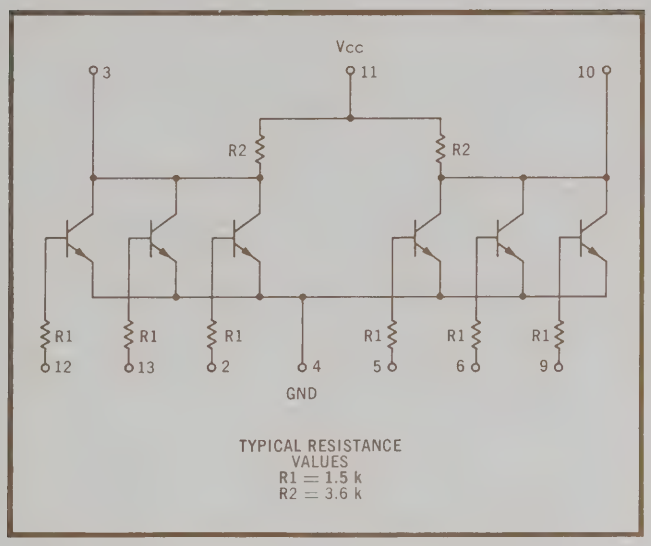
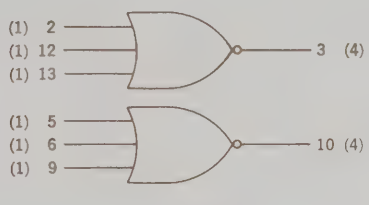
DS 9081

MC718P • MC818P

ISSUE A



A monolithic device consisting of two 3-input positive logic NOR gates. Each may be used independently, paralleled for increasing the number of inputs (subject to loading rules), or cross-connected to form bistable elements.



$3 = \overline{2 + 12 + 13}$

NUMBER IN PARENTHESIS INDICATES LOADING FACTOR

t_{pd} = 27 ns
P_D = 12 mW (Input High)
2.5 mW (Inputs Low)

ELECTRICAL CHARACTERISTICS

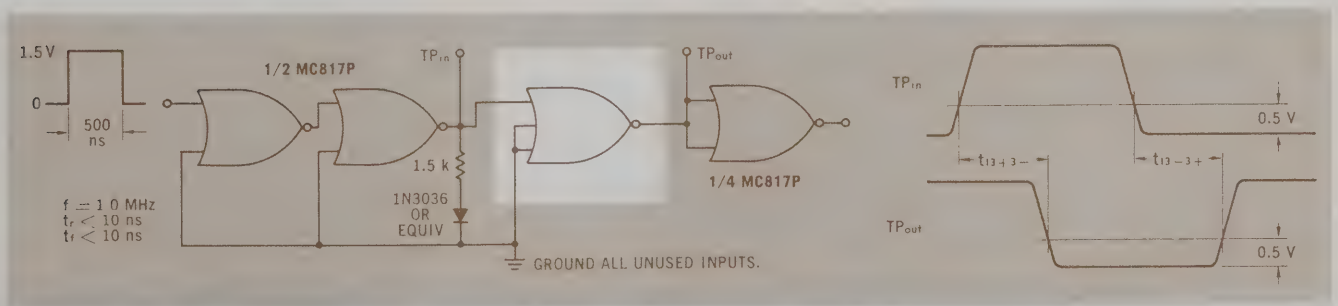
TEST PROCEDURES ARE SHOWN FOR ONE GATE ONLY. THE OTHER GATE IS TESTED IN THE SAME MANNER.

	@ Test Temperature	TEST VOLTAGE VALUES (Volts) V_{in}	V_{on}	V_{BOT}	V_{off}	V_{CC}
MC818P	0°C	0.880	0.850	1.80	0.500	3.60
	+25°C	0.830	0.800	1.80	0.460	3.60
	+75°C	0.740	0.710	1.80	0.400	3.60
MC718P	+15°C	0.865	0.865	1.80	0.475	3.60
	+25°C	0.850	0.850	1.80	0.460	3.60
	+55°C	0.800	0.800	1.80	0.430	3.60

Characteristic	Symbol	Pin Under Test	MC818P Test Limits 0°C Min	0°C Max	+25°C Min	+25°C Max	+75°C Min	+75°C Max	Unit	MC718P Test Limits +15°C Min	+15°C Max	+25°C Min	+25°C Max	+55°C Min	+55°C Max	Unit	TEST VOLTAGE APPLIED TO PINS LISTED BELOW: V_{in}	V_{on}	V_{BOT}	V_{off}	V_{CC}	Gnd
Input Current	I_{in}	2	-	150	-	140	-	140	μAdc	-	150	-	150	-	150	μAdc	2	-	12, 13	-	11	4
		12	-	↓	-	↓	-	↓	↓	-	↓	-	↓	-	↓	↓	12	-	2, 13	-	↓	↓
		13	-	↓	-	↓	-	↓	↓	-	↓	-	↓	-	↓	↓	13	-	2, 12	-	↓	↓
Output Current	I_{A4}	3	570	-	570	-	535	-	μAdc	570	-	570	-	570	-	μAdc	3	-	-	2.12.13	11	4
Output Voltage	V_{out}	3	-	400	-	350	-	300	mVdc	-	400	-	300	-	320	mVdc	-	12	-	-	11	2.4.13
		3	-	↓	-	↓	-	↓	↓	-	↓	-	↓	-	↓	↓	-	13	-	-	↓	2.4.13
		3	-	↓	-	↓	-	↓	↓	-	↓	-	↓	-	↓	↓	-	2	-	-	↓	4.12.13
Saturation Voltage	$V_{CE(sat)}$	3	-	250	-	250	-	250	mVdc	-	220	-	230	-	320	mVdc	-	-	12	-	11	2.4.13
		3	-	↓	-	↓	-	↓	↓	-	↓	-	↓	-	↓	↓	-	-	13	-	↓	2.4.12
		3	-	↓	-	↓	-	↓	↓	-	↓	-	↓	-	↓	↓	-	-	2	-	↓	4.12.13
Switching Time	$t_{on} - t_{off}$	3, 13	-	-	-	90	-	-	ns	-	-	-	90	-	-	ns	Pulse In 13	Pulse Out 3	-	-	11	2.4.12

Ground unused input pins. Other pins not listed are left open.

SWITCHING TIMES TEST CIRCUIT AND WAVEFORMS



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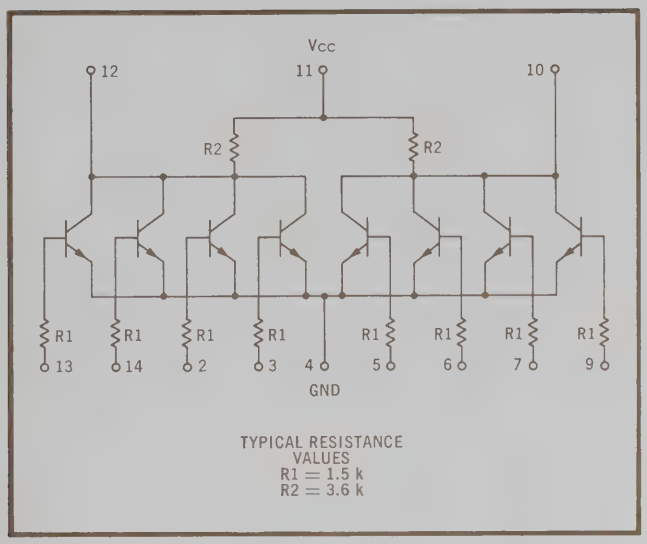
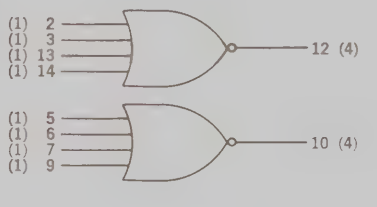
MC719P • MC819P

ISSUE A



TYPICAL RESISTANCE VALUES
R1 = 1.5 k
R2 = 3.6 k

A monolithic device consisting of two 4-input positive logic NOR gates. Each may be used independently, paralleled for increasing the number of inputs (subject to loading rules), or cross-coupled to form bistable elements.



$12 = \overline{2 + 3 + 13 + 14}$

NUMBER IN PARENTHESIS INDICATES LOADING FACTOR

t_{pd} = 27 ns
P_D = 13 mW (Input High)
2.5 mW (Inputs Low)

ELECTRICAL CHARACTERISTICS

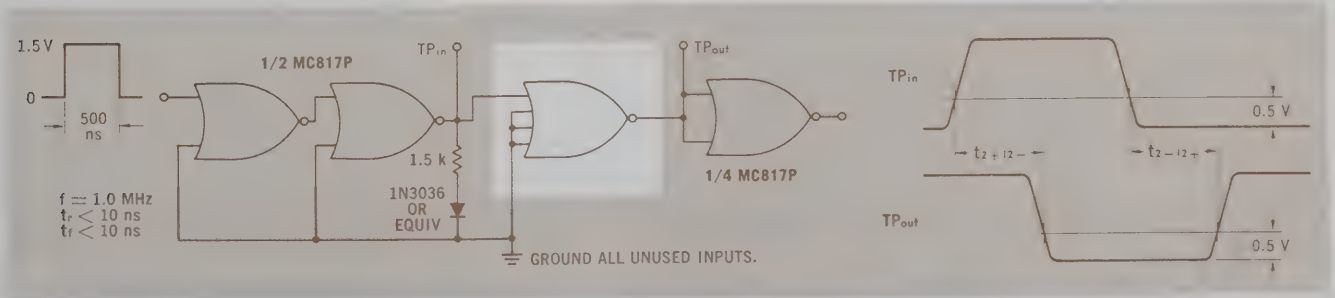
TEST PROCEDURES ARE SHOWN FOR ONE GATE ONLY. THE OTHER GATE IS TESTED IN THE SAME MANNER.

	@ Test Temperature	TEST VOLTAGE VALUES (Volts) V_{in}	V_{on}	V_{BOT}	V_{off}	V_{CC}
MC819P	0°C	0.880	0.850	1.80	0.500	3.60
	+25°C	0.830	0.800	1.80	0.460	3.60
	+75°C	0.740	0.710	1.80	0.400	3.60
MC719P	+15°C	0.865	0.865	1.80	0.475	3.60
	+25°C	0.850	0.850	1.80	0.460	3.60
	+55°C	0.800	0.800	1.80	0.430	3.60

Characteristic	Symbol	Pin Under Test	MC819P Test Limits 0°C Min	0°C Max	+25°C Min	+25°C Max	+75°C Min	+75°C Max	Unit	MC719P Test Limits +15°C Min	+15°C Max	+25°C Min	+25°C Max	+55°C Min	+55°C Max	Unit	TEST VOLTAGE APPLIED TO PINS LISTED BELOW: V_{in}	V_{on}	V_{BOT}	V_{off}	V_{CC}	Gnd
Input Current	I_{in}	2	-	150	-	140	-	140	μAdc	-	150	-	150	-	150	μAdc	2	-	3.13.14	-	11	4
		3	-		-		-			-		-		-			3	-	2.13.14	-		
		13	-		-		-			-		-		-			13	-	2.3.14	-		
		14	-	▼	-	▼	-	▼	▼	-	▼	-	▼	-	▼	▼	14	-	2.3.13	-	▼	▼
Output Current	I_{A4}	12	570	-	570	-	535	-	μAdc	570	-	570	-	570	-	μAdc	-	12	-	2.3.13. 14	11	4
Output Voltage	V_{out}	12	-	400	-	350	-	300	mVdc	-	400	-	300	-	320	mVdc	-	13	-	-	11	2,3,4,14
		12	-		-		-			-		-		-			-	14	-	-		2,3,4,13
		12	-		-		-			-		-		-			-	2	-	-		3,4,13,14
		12	-	▼	-	▼	-	▼	▼	-	▼	-	▼	-	▼	▼	-	3	-	-	▼	2,4,13,14
Saturation Voltage	$V_{CE(sat)}$	12	-	250	-	250	-	250	mVdc	-	220	-	230	-	320	mVdc	-	-	13	-	11	2,3,4,14
		12	-		-		-			-		-		-			-	-	14	-		2,3,4,13
		12	-		-		-			-		-		-			-	-	2	-		3,4,13,14
		12	-	▼	-	▼	-	▼	▼	-	▼	-	▼	-	▼	▼	-	-	3	-	▼	2,4,13,14
Switching Time	$t_{on} - t_{off}$	2,12	-	-	-	90	-	-	ns	-	-	-	90	-	-	ns	Pulse In: 2	Pulse Out: 12	-	-	11	3,4,13,14

Ground inputs of gate not under test. Other pins not listed are left open.

SWITCHING TIMES TEST CIRCUIT AND WAVEFORMS



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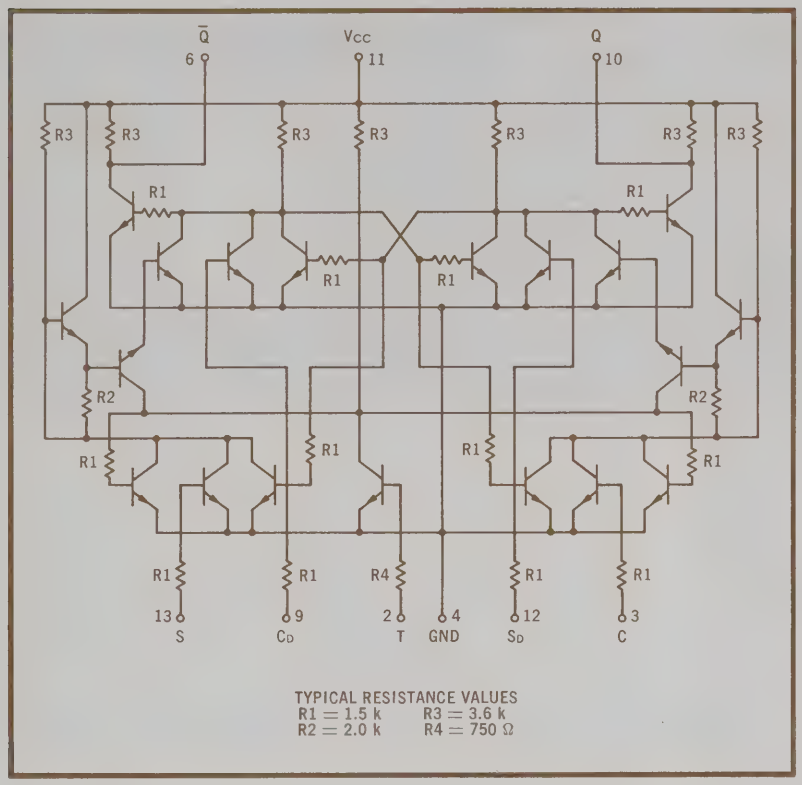
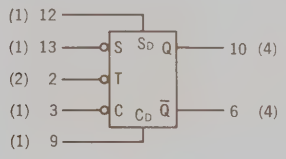
MC722P • MC822P

ISSUE A



TYPICAL RESISTANCE VALUES
R1 = 1.5 k R3 = 3.6 k
R2 = 2.0 k R4 = 750 Ω

A J-K flip-flop with direct clear and direct set inputs in addition to the clocked inputs.



DIRECT INPUT OPERATION ①

S_D	C_D	Q	$\bar{Q}$
0	0	②	②
1	0	1	0
0	1	0	1
1	1	0	0

CLOCKED INPUT OPERATION ③

t_n		t_{n+1}	
S	C	Q	$\bar{Q}$
1	1	Q_n	$\bar{Q}_n$
1	0	1	0
0	1	0	1
0	0	$\bar{Q}_n$	Q_n

1. Clock (T) to remain unchanged.
2. The output state will not change when the input state goes from $S_D = \bar{C}_D$ to $S_D = C_D = 0$. The ouput state cannot be predetermined in the case where the input goes from $S_D = C_D = 1$ to $S_D = C_D = 0$.
3. Direct inputs (S_D and C_D) must be low.

0 = low state

1 = high state

t_n = time period prior to negative transition of clock pulse

t_{n+1} = time period subsequent to negative transition of clock pulse

Q_n = state of Q output in time period t_n

NUMBER IN PARENTHESIS INDICATES LOADING FACTOR

$f_{tog} = 1.0$ MHz
$P_D = 24$ mW (Only Clock Input High)
20 mW (Inputs Low)

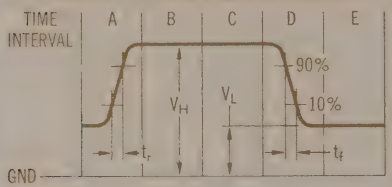
	@ Test Temperature	TEST VOLTAGE VALUES (Volts) V_{in}	V_{on}	V_{BOT}	V_{off}	V_{CC}
MC822P	0°C	0.880	0.850	1.80	0.500	3.60
	+25°C	0.830	0.800	1.80	0.460	3.60
	+75°C	0.740	0.710	1.80	0.400	3.60
MC722P	+15°C	0.865	0.865	1.80	0.475	3.60
	+25°C	0.850	0.850	1.80	0.460	3.60
	+55°C	0.800	0.800	1.80	0.430	3.60

ELECTRICAL CHARACTERISTICS

Characteristic	Symbol	Pin Under Test	MC822P Test Limits 0°C Min	0°C Max	+25°C Min	+25°C Max	+75°C Min	+75°C Max	Unit	MC722P Test Limits +15°C Min	+15°C Max	+25°C Min	+25°C Max	+55°C Min	+55°C Max	Unit	TEST VOLTAGE APPLIED TO PINS LISTED BELOW: V_{in}	V_{on}	V_{BOT}	V_{off}	V_{CC}	Gnd
Input Current	$2I_{in}$	2	-	300	-	280	-	280	μAdc	-	300	-	300	-	300	μAdc	2	-	3, 13	-	11	4
	I_{in}	3	-	150	-	140	-	140		-	150	-	150	-	150		3	-	12	-		
		9	-		-		-			-		-		-			9	-	-	-		
		12	-		-		-			-		-		-			12	-	-	-		
		13	-	↓	-	↓	-	↓	↓	-	↓	-	↓	-	↓	↓	13	-	9	-	↓	↓
Output Current	I_{A4}	6	570	-	570	-	535	-	μAdc	570	-	570	-	570	-	μAdc	6	9	12	-	11	4
		10	570	-	570	-	535	-	μAdc	570	-	570	-	570	-	μAdc	10	12	9	-	11	4
Saturation Voltage	$V_{CE(sat)}$	6	-	250	-	250	-	250	mVdc	-	220	-	230	-	320	mVdc	-	12	-	9	11	4
		6*#	-		-		-			-		-		-			-	13	-	3		
		6*#	-		-		-			-		-		-			-	-	-	3, 13		
		6*##	-		-		-			-		-		-			-	3, 13	-	-		
		10	-		-		-			-		-		-			-	9	-	12		
		10*##	-		-		-			-		-		-			-	3	-	13		
		10*#	-		-		-			-		-		-			-	3, 13	-	-		
		10*##	-	↓	-	↓	-	↓	↓	-	↓	-	↓	-	↓	↓	-	-	-	3, 13	↓	↓

Pins not listed are left open.
* = Clock Pulse to pin 2, see Figure 1.
# = Pin 9 HIGH, ## = Pin 12 HIGH } Set by a momentary application of V_{BOT} prior to the application of the negative-going clock pulse.

FIGURE 1 — CLOCK PULSE DEFINITION



SEQUENCE OF EVENTS

A. Voltage applied to Clock pin is raised to V_H. t_r is not critical but should be $< 1.0\ \mu s$.

B. Biases of all other inputs are applied. V_{CC} is applied without interruption throughout the testing.

C. Apply momentary ground (when applicable).

D. Clock pulse is allowed to fall to V_L. t_f must remain within 10 ns minimum and 200 ns maximum.

E. Electrical measurements are read out. Load current over-shoot must be limited to 10% or the flip-flop may be tripped and the wrong output conditions occur.

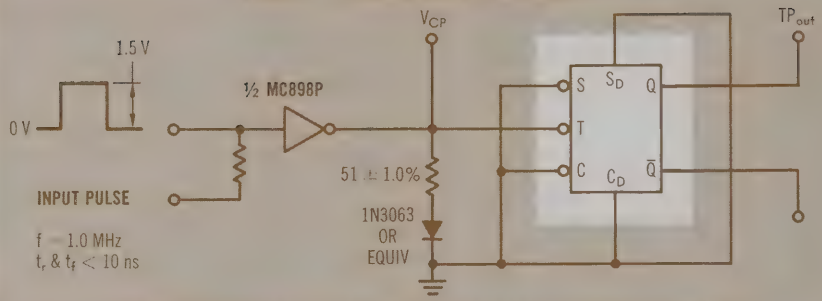
MC822P

T_A	V_L	V_H
+ 25°C	+ 0.460 V ± 2.0 mV	+ 0.850 V ± 2.0 mV
0°C	+ 0.500 V ± 2.0 mV	+ 0.900 V ± 2.0 mV
+ 75°C	− 0.400 V ± 2.0 mV	+ 0.760 V ± 2.0 mV

MC722P

T_A	V_L	V_H
+ 25°C	+ 0.460 V ± 2.0 mV	+ 0.900 V ± 2.0 mV
+ 15°C	+ 0.475 V ± 2.0 mV	+ 0.915 V ± 2.0 mV
+ 55°C	+ 0.430 V ± 2.0 mV	+ 0.850 V ± 2.0 mV

FIGURE 2 — TOGGLE MODE TEST CIRCUIT



THE SENSE FREQUENCY AT TP_{out} (0.5 MHz) SHOULD BE ½ THE FREQUENCY AT V_{CP} WHEN THE DUTY CYCLE IS VARIED BETWEEN 25% AND 75%.

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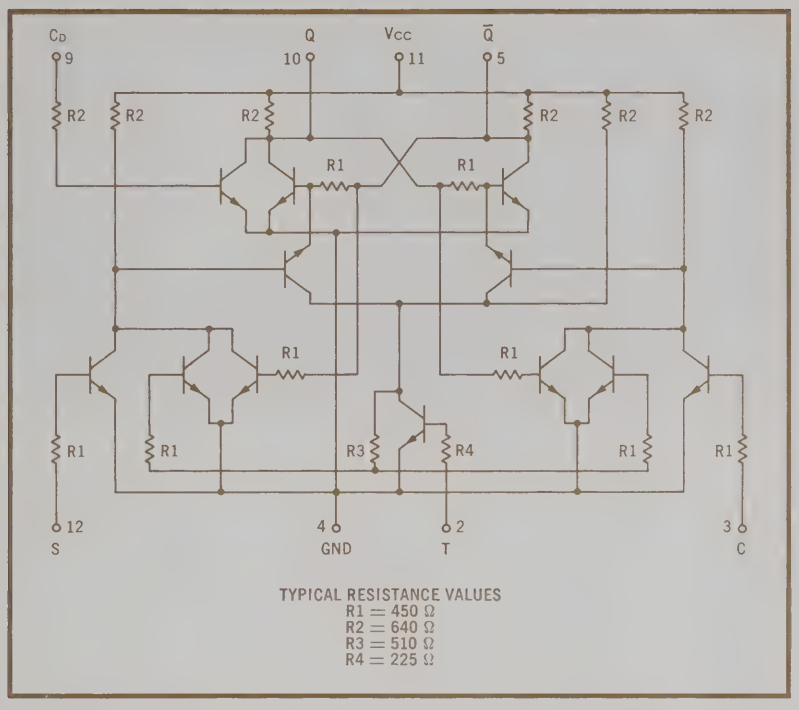
DS 9081

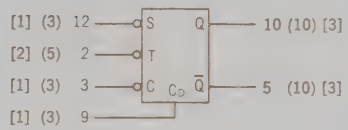
MC723P • MC816P

ISSUE A



TYPICAL RESISTANCE VALUES
R1 = 450 Ω
R2 = 640 Ω
R3 = 510 Ω
R4 = 225 Ω

A J-K flip-flop with a direct clear input in addition to the clocked inputs.



CLOCKED INPUT OPERATION ①

$t_{n-②}$		t_{n} - ②	
S	C	Q	Q̄
1	1	Q-③	Q̄-③
1	0	1	0
0	1	0	1
0	0	Q̄-	Q-③

1. Direct input (C_D) must be low.
2. The time period prior to the negative transition of the clock pulse is denoted t_n and the time period subsequent to this transition is denoted t_{n+1}.
3. Q_n is the state of the Q output in the time period t_n.
4. Clock pulse fall time must be < 100 ns.

NUMBER IN PARENTHESIS INDICATES LOADING FACTOR FOR mW MRTL
NUMBER IN BRACKETS INDICATES LOADING FACTOR FOR MRTL

f_{Tog} = 4 MHz

P_D = 91 mW (Only Clock Input High)
79 mW (Inputs Low)

	@ Test Temperature	TEST VOLTAGE VALUES (Volts) V_{in}	V_{on}	V_{BOT}	V_{off}	V_{CC}
MC816P	0°C	0.960	0.930	1.80	0.570	3.60
	+25°C	0.910	0.880	1.80	0.500	3.60
	+75°C	0.820	0.790	1.80	0.450	3.60
MC723P	+15°C	0.865	0.835	1.80	0.475	3.60
	+25°C	0.850	0.850	1.80	0.460	3.60
	+55°C	0.800	0.800	1.80	0.450	3.60

ELECTRICAL CHARACTERISTICS

Characteristic	Symbol	Pin Under Test	MC816P Test Limits 0°C Min	0°C Max	+25°C Min	+25°C Max	+75°C Min	+75°C Max	Unit	MC723P Test Limits +15°C Min	+15°C Max	+25°C Min	+25°C Max	+55°C Min	+55°C Max	Unit	TEST VOLTAGE APPLIED TO PINS LISTED BELOW: V_{in}	V_{on}	V_{BOT}	V_{off}	V_{CC}	Gnd
Input Current	$2I_{in}$ / I_{in}	2	-	1200	-	1200	-	1140	μAdc	-	1000	-	1000	-	940	μAdc	2	-	3, 12	-	11	4
		3	-	600	-	600	-	570		-		-		-			3	-	10	-		
		9	-		-		-			-		-		-			9	-	5	-		
		12	-		-		-			-		-		-			12	-	5	-		
Output Current	I_{A3}	5	1.80	-	1.80	-	1.71	-	mAdc	1.65	-	1.65	-	1.56	-	mAdc	-	5	3, 12	-	11	4
		5		-		-		-			-		-		-		-	5, 9	12	-		4
		10		-		-		-			-		-		-		-	10	3	9		4.5
Output Voltage	V_{out}	10	-	500	-	400	-	400	mVdc	-	400	-	300	-	320	mVdc	-	9	-	-	11	4.5
		10*##	-		-		-			-		-		-			-	3, 12	-	-		4.5
		10*	-		-		-			-		-		-			-	3	-	12		
		10*##	-		-		-			-		-		-			-	-	-	3, 12		
Saturation Voltage	$V_{CE(sat)}$	5	-	400	-	300	-	350	mVdc	-	300	-	290	-	320	mVdc	-	-	-	9	11	4.5
		10	-		-		-			-		-		-			-	-	3	-		4.5
		10	-		-		-			-		-		-			-	-	-	-		4.5
Turn-On Voltage	V_{on}	10*##Δ	930	-	880	-	790	-	mVdc	865	-	850	-	800	-	mVdc	-	3, 12	-	-	11	4.9
		10*Δ		-		-		-			-		-		-		-	12	-	3		
		10*Δ		-		-		-			-		-		-		-	-	-	3, 12		

Pins not listed are left open.

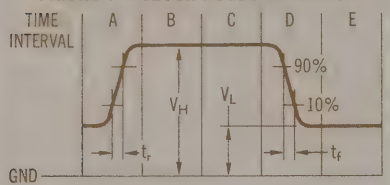
§ = Silicon diode to ground.

* = Clock Pulse to pin 2, See Figure 1.

= Pin 10 LOW
= Pin 5 LOW
} Set by a momentary ground prior to the application of the negative-going Clock pulse.

Δ = MC816P pin 10 loaded by: 1.56 mAdc (0°C and +75°C)
1.65 mAdc (+25°C)
MC723P pin 10 loaded by: 1.56 mAdc (+15°C and +55°C)
1.65 mAdc (+25°C)

FIGURE 1 — CLOCK PULSE DEFINITION



SEQUENCE OF EVENTS

A. Voltage applied to Clock pin is raised to V_H. t_r is not critical but should be $< 1.0\ \mu s$.

B. Biases of all other inputs are applied. V_{CC} is applied without interruption throughout the testing.

C. Apply momentary ground (when applicable).

D. Clock pulse is allowed to fall to V_L. t_f must remain within 10 ns minimum and 100 ns maximum.

E. Electrical measurements are read out. Load current over-shoot must be limited to 10% or the flip-flop may be tripped and the wrong output conditions occur.

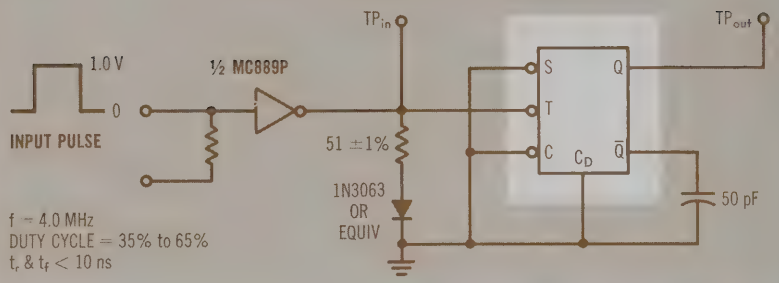
MC816P

T_A	V_L	V_H
+ 25°C	+0.500 V ± 2.0 mV	+0.930 V ± 2.0 mV
0°C	+0.570 V ± 2.0 mV	+0.980 V ± 2.0 mV
+ 75°C	+0.450 V ± 2.0 mV	+0.840 V ± 2.0 mV

MC723P

T_A	V_L	V_H
+ 25°C	+ 0.460 V ± 2.0 mV	+0.900 V ± 2.0 mV
+ 15°C	+ 0.475 V ± 2.0 mV	+0.915 V ± 2.0 mV
+ 55°C	+ 0.430 V ± 2.0 mV	+0.850 V ± 2.0 mV

FIGURE 2 — TOGGLE MODE TEST CIRCUIT



f = 4.0 MHz
DUTY CYCLE = 35% to 65%
t_r & $t_f < 10$ ns

FREQUENCY AT TP_{out} SHOULD BE ½ THE FREQUENCY AT TP_{in}

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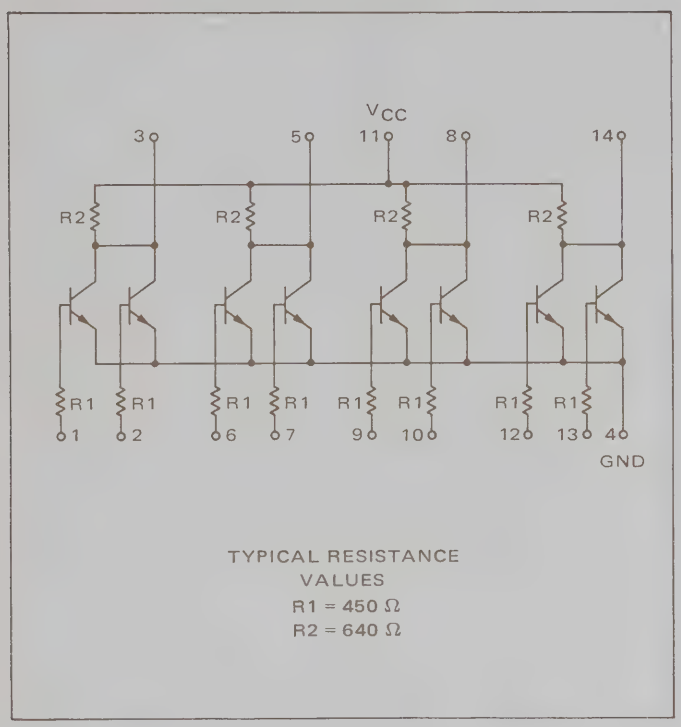
MC724P • MC824P
MC724AP • MC824AP

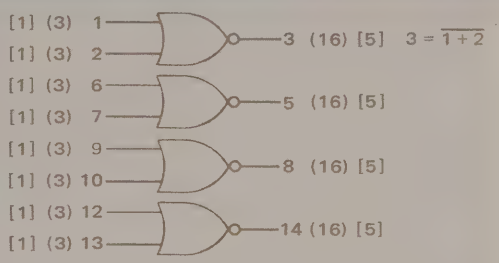
ISSUE B



TYPICAL RESISTANCE VALUES
R1 = 450 Ω
R2 = 640 Ω

This monolithic device consists of four 2-input positive logic NOR gates. Each may be used independently, or cross-coupled to form bistable elements.

The MC724AP and MC824AP are compatible with MTTL and MDTL devices. Extra electrical tests are performed to insure that the devices will drive two MDTL loads and at least one MTTL load using any MTTL family.



Number in Parenthesis Indicates mW MRTL Loading Factor.
Number in Brackets Indicates MRTL Loading Factor.

t_{pd} = 12 ns
P_D = 100 mW (Input High)
30 mW (Inputs Low)

ELECTRICAL CHARACTERISTICS

Test procedures are shown for only one gate. The other gates are tested in the same manner.

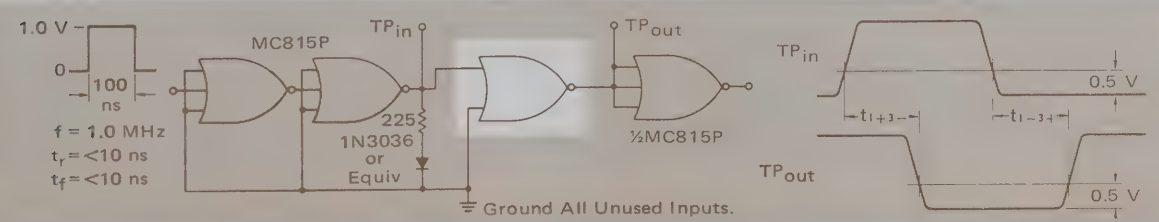
Tests and limits in shaded areas apply to the "A" suffix devices only, and insure capability to drive two MDTL loads or at least one MTTL load.

	@ Test Temperature	TEST VOLTAGE/CURRENT VALUES (Volts) V_{in}	V_{on}	V_{BOT}	V_{off}	V_{CC}	(mA) I_{OL}	I_{OH}
MC824P, MC824AP	0°C	0.960	0.930	1.80	0.570	3.60	2.80	-0.12
	+25°C	0.910	0.880	1.80	0.500	3.60	2.80	-0.12
	+75°C	0.820	0.790	1.80	0.450	3.60	2.66	-0.12
MC724P, MC724AP	+15°C	0.865	0.865	1.80	0.475	3.60	2.80	-0.12
	+25°C	0.850	0.850	1.80	0.460	3.60	2.80	-0.12
	+55°C	0.800	0.800	1.80	0.430	3.60	2.66	-0.12

Characteristic	Symbol	Pin Under Test	MC824P, MC824AP Test Limits 0°C Min	0°C Max	+25°C Min	+25°C Max	+75°C Min	+75°C Max	Unit	MC724P, MC724AP Test Limits +15°C Min	+15°C Max	+25°C Min	+25°C Max	+55°C Min	+55°C Max	Unit	TEST VOLTAGE/CURRENT APPLIED TO PINS LISTED BELOW: V_{in}	V_{on}	V_{BOT}	V_{off}	V_{CC}	I_{OL}	I_{OH}	Gnd
Input Current	I_{in}	1	–	600	–	600	–	570	μAdc	–	500	–	500	–	470	μAdc	1	–	2	–	11	–		4
		2	–	600	–	600		570	μAdc	–	500		500	–	470	μAdc	2		1		11			4
Output Current	I_{A5}	3	-3.0	–	-3.0	–	-2.85	–	mAdc	-2.65	–	-2.65		-2.50	–	mAdc	–	3		1.2	11	–		4
Output Voltage	V_{out}	3	–	500	–	400	–	400	mVdc	–	400	–	300		320	mVdc	–	1			11			2,4
		3	–	500	–	400	–	400	mVdc		400	–	300		320	mVdc		2			11			1,4
	V_{OL}	3	–	500		500	–	550	mVdc		500	–	500	–	550	mVdc		–	1		11	3		2,4
		3		500	–	500		550	mVdc	–	500	–	500		550	mVdc	–	–	2		11	3		1,4
	V_{OH}	3	2.60	–	2.60	–	250	–	Vdc	2.60		2.60	–	2.50	–	Vdc	–	–	–	1.2	11		3	4
Saturation Voltage	$V_{CE(sat)}$	3	–	400	–	300	–	350	mVdc		300	–	290		320	mVdc	–	–	1		11	–		2,4
		3		400		300	–	350	mVdc		300		290	–	320	mVdc			2	–	11	–		1,4
Switching Time	$t_{on} + t_{off}$	1,3		–		48	–		ns	–	–	–	48		–	ns	Pulse In 1	Pulse Out 3	–		11	–		2,4

Ground input pins of gates not under test. Other pins not listed are left open.

SWITCHING TIME TEST CIRCUIT AND WAVEFORMS



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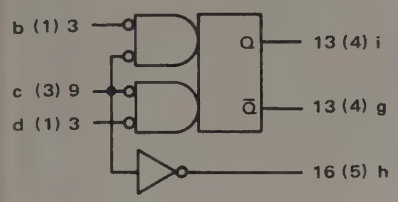
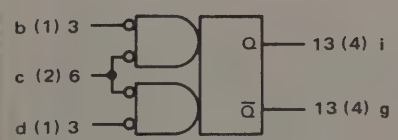
SHIFT REGISTERS

MC705, MC805, MC905
Half-Shift Register



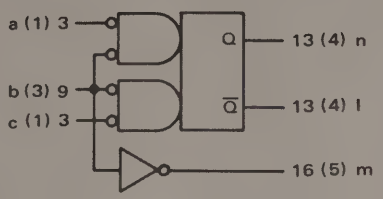
$i = \overline{g}\,(b + c)$
$g = \overline{i}\,(c + d)$

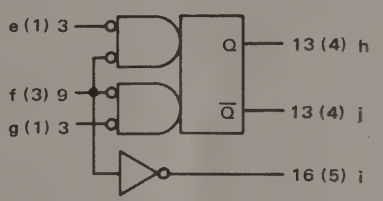
MC706, MC806, MC906
Half-Shift Register
(without inverter)



$i = \overline{g}\,(b + c)$
$g = \overline{i}\,(c + d)$

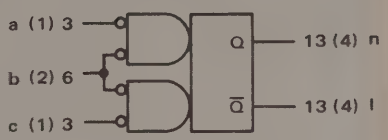
MC783, MC883, MC983
Dual Half-Shift Register

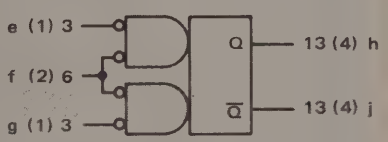




$n = \overline{l}\,(a + b)$
$l = \overline{n}\,(c + b)$

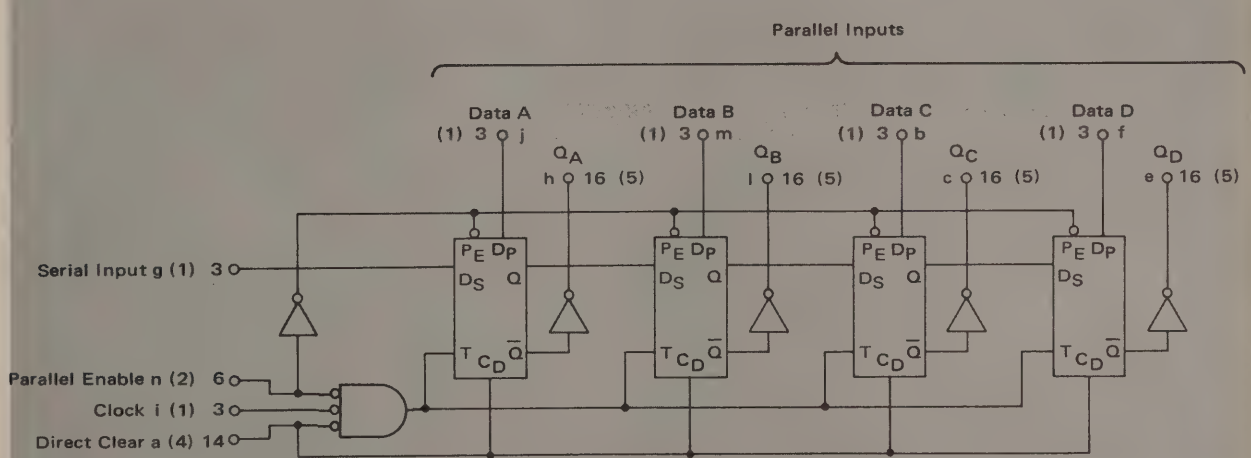
MC784, MC884, MC984
Dual Half-Shift Register
(without inverter)





$n = \overline{l}\,(a + b)$
$l = \overline{n}\,(c + b)$

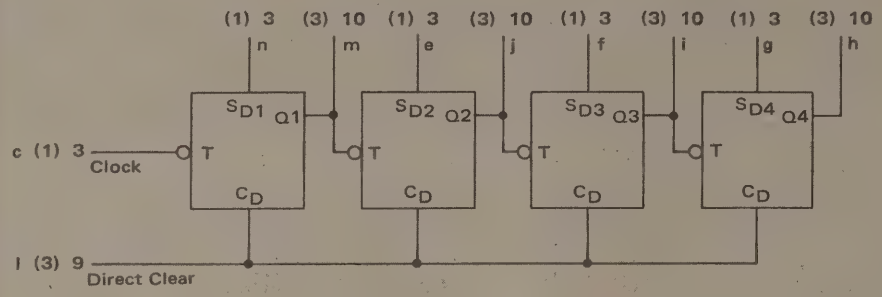
MC794, MC894
Serial-Parallel Shift Register



MRTL LOGIC DIAGRAMS

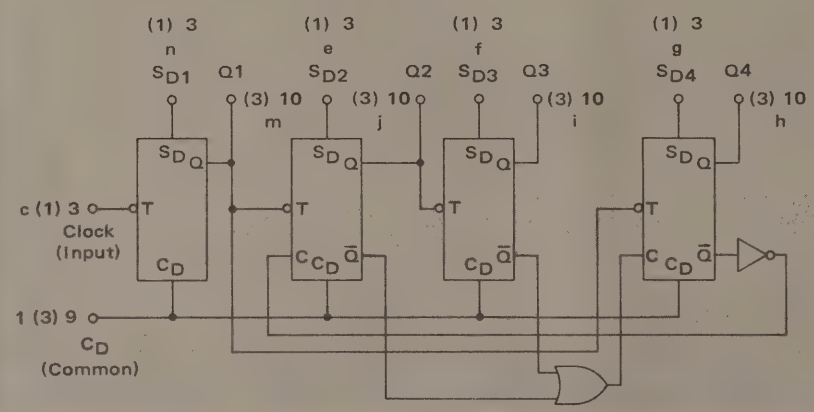
COUNTERS

MC777, MC877
Binary Up Counter



DECODING LOGIC	
0	$\bar{A}\,\bar{B}\,\bar{C}\,\bar{D}$
1	$A\,\bar{B}\,\bar{C}\,\bar{D}$
2	$\bar{A}\,B\,\bar{C}\,\bar{D}$
3	$A\,B\,\bar{C}\,\bar{D}$
4	$\bar{A}\,\bar{B}\,C\,\bar{D}$
5	$A\,\bar{B}\,C\,\bar{D}$
6	$\bar{A}\,B\,C\,\bar{D}$
7	$A\,B\,C\,\bar{D}$
8	$\bar{A}\,\bar{B}\,\bar{C}\,D$
9	$A\,\bar{B}\,\bar{C}\,D$
10	$\bar{A}\,B\,\bar{C}\,D$
11	$A\,B\,\bar{C}\,D$
12	$\bar{A}\,\bar{B}\,C\,D$
13	$A\,\bar{B}\,C\,D$
14	$\bar{A}\,B\,C\,D$
15	$A\,B\,C\,D$

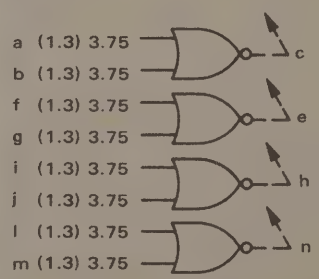
MC780, MC880
Decade Up Counter



DECODING LOGIC				
0	$\bar{A}$	$\bar{B}$	$\bar{C}$	$\bar{D}$
1	A	$\bar{B}$	$\bar{C}$	$\bar{D}$
2	$\bar{A}$	B	$\bar{C}$	$\bar{D}$
3	A	B	$\bar{C}$	$\bar{D}$
4	$\bar{A}$	$\bar{B}$	C	$\bar{D}$
5	A	$\bar{B}$	C	$\bar{D}$
6	$\bar{A}$	B	C	$\bar{D}$
7	A	B	C	$\bar{D}$
8	$\bar{A}$	$\bar{B}$	$\bar{C}$	D
9	A	$\bar{B}$	$\bar{C}$	D

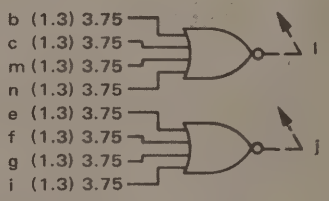
EXPANDERS

MC785,A, MC885,A, MC985
Quad 2-Input Expander



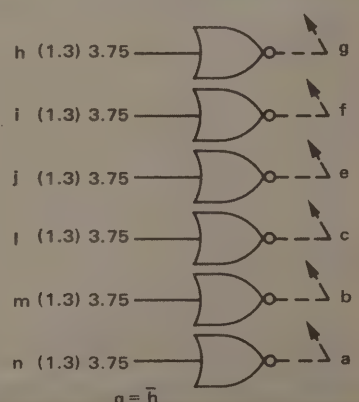
$c = \overline{a + b}$

MC786, MC886, MC986
Dual 4-Input Expander



$l = \overline{b + c + m + n}$

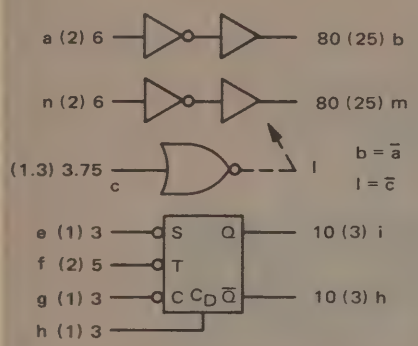
MC9719,A, MC9819,A,
Hex Expander



$g = \bar{h}$

MULTIFUNCTION DEVICES

MC779, MC879
(1 J-K Flip-Flop, 1 Expander, 2 Buffers)

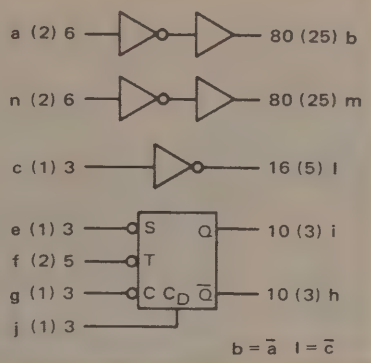


CLOCKED INPUT OPERATION①

t_n②		t_{n+1}②	
S	C	Q	$\bar{Q}$
1	1	Q_n③	$\bar{Q}_n$
1	0	1	0
0	1	0	1
0	0	$\bar{Q}_n$	Q_n③

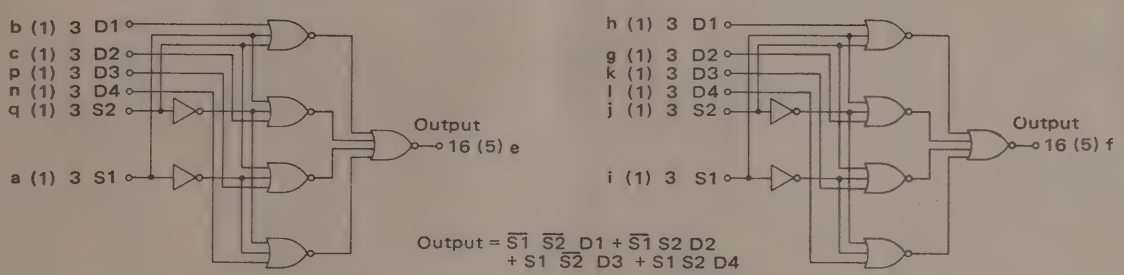
1. Direct input (C_D) must be low.
2. The time period prior to the negative transition of the clock pulse is denoted t_n and the time period subsequent to this transition is denoted t_{n+1}.
3. Q_n is the state of the Q output in the time period t_n.

MC787, MC887
(1 J-K Flip-Flop, 1 Inverter, 2 Buffers)



DATA ROUTING FUNCTIONS

MC9701, MC9801
Dual 4-Channel Data Selector

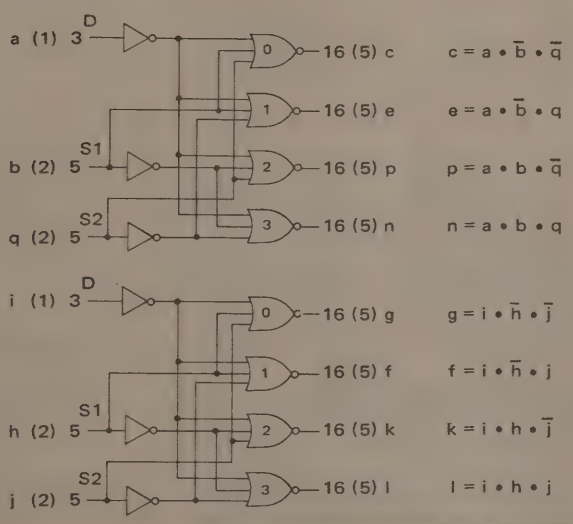


Output = $\bar{S1}\ \bar{S2}$ D1 + $\bar{S1}$ S2 D2 + S1 $\bar{S2}$ D3 + S1 S2 D4

TRUTH TABLE

Input Select		Data Line
S1	S2	Selected
0	0	D1
0	1	D2
1	0	D3
1	1	D4

MC9707, MC9807
Dual 4-Channel Date Distributor



TRUTH TABLE

	INPUTS			OUTPUTS			
	D	S1	S2	0	1	2	3
Pin Numbers	a i	b h	q j	c g	e f	p k	n l
Level	0	*	*	0	0	0	0
	1	0	0	1	0	0	0
	1	0	1	0	1	0	0
	1	1	0	0	0	1	0
	1	1	1	0	0	0	1

*Either state.

MAXIMUM RATINGS (T_A = 25°C)

Rating	Symbol	Value	Unit
Input Voltage	—	±4	Vdc
Power Supply Voltage (Pulsed ≤ 1 second)	—	+6	Vdc
Operating Temperature Range MC900 Series MC800F,G Series MC800P Series MC700 Series	T_A	 –55 to +125 0 to +100 0 to +75 +15 to +55	°C
Storage Temperature Range Metal Can, Flat Package Plastic Package	T_{stg}	 –65 to +150 –55 to +125	°C

INSTRUCTIONS FOR USE OF PACKAGE INFORMATION TABLE

MC900, MC800, and MC700 Series Medium-Power MRTL devices are available in the packages pictured in the following table as indicated on the line following each device type number. Plastic packaged devices are available in the MC700/800 Series only.

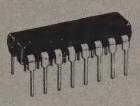
Pin numbers for any of the following devices and packages may be determined by:

1. Find the device among the logic diagrams appearing on the preceding pages (grouped by function). Note the alpha pin designations for the device.
2. Find the device type number in the left hand columns of the "Package Information Table".
3. The letters in the columns following the type number and below the drawing of the desired package indicate the correct pin numbers for the specific package by their numbered positions beneath the package drawing. (These letters are the same as indicated on the logic diagram for the device.)
4. Notes: Blanks in an area following the type number and directly beneath a package indicate the device is not available in that package.
   A dash indicates this pin or lead is not connected nor otherwise utilized for this device and package.
   * indicates this pin number is the ground connection for this device and package.
   # indicates this pin number is the V_{CC} connection for this device and package.

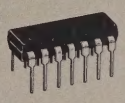
PACKAGE INFORMATION TABLE

(See instructions on preceding page.)

P SUFFIX PLASTIC PACKAGES

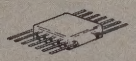


CASE 648
(16 pin)



CASE 646
(14 pin)

F SUFFIX CERAMIC PACKAGES



CASE 607
(14 pin)

CASE 606
TO-91
(10 pin)

G SUFFIX METAL PACKAGES

CASE 603
TO-100
(10 pin)

CASE 601
(8 pin)

Type No.			Pin No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	1	2	3	4	5	6	7	8	9	10	11	12	13	14	1	2	3	4	5	6	7	8	9	10
MC700	MC800	MC900																		–	b	–	d	*	–	g	–	i	#					b	–	d	*	g	–	i	#		
MC701	MC801	MC901																																a	b	c	*	e	–	g	#		
MC702	MC802	MC902																																a	–	c	*	e	–	g	#		
MC703	MC803	MC903																		–	b	c	d	*	–	–	h	–	#					b	c	d	*	–	h	–	#		
MC704	MC804	MC904																		–	b	c	d	*	–	g	h	i	#					b	c	d	*	g	h	i	#		
MC705	MC805	MC905																		–	b	c	d	*	–	g	h	i	#					b	c	d	*	g	h	i	#		
MC706	MC806	MC906																		–	b	c	d	*	–	g	–	i	#					b	c	d	*	g	–	i	#		
MC707	MC807	MC907																		–	b	c	d	*	–	g	h	–	#					b	c	d	*	g	h	–	#		
MC714	MC814	MC914																		–	b	c	d	*	–	g	h	i	#					b	c	d	*	g	h	i	#		
MC715	MC815	MC915		–	b	c	*	e	f	–	–	i	j	#	l	m	n			b	l	m	c	*	e	f	i	j	#					b	l	m	c	*	e	f	i	j	#
–	MC816	MC916		–	b	c	*	e	–	–	–	i	j	#	l	–	–			–	l	b	c	*	–	e	i	j	#					l	b	c	*	e	i	j	#		
MC723	–	–		–	b	c	*	e	–	–	–	i	j	#	l	–	–			–	l	b	c	*	–	e	i	j	#					l	b	c	*	e	i	j	#		
MC724,A	MC824,A	MC924		a	b	c	*	e	f	g	h	i	j	#	l	m	n			a	b	c	f	g	e	*	h	i	j	n	l	m	#										
MC725	MC825	MC925		–	b	c	*	e	f	g	–	i	j	#	l	m	n			l	b	c	–	m	n	*	e	f	g	–	i	j	#										
MC726	MC826	MC926		–	b	c	*	–	f	–	–	i	j	#	l	n	–			l	m	b	c	*	–	f	i	j	#					l	m	b	c	*	–	f	i	j	#
			Pin No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	1	2	3	4	5	6	7	8	9	10	11	12	13	14	1	2	3	4	5	6	7	8	9	10
MC727	MC827	MC927																		a	b	c	d	*	f	g	h	i	#					a	b	c	d	*	f	g	h	i	#
MC729	MC829	MC929																		–	b	c	d	*	–	g	h	i	#					b	c	d	*	g	h	i	#		
MC771	MC871	MC971		a	b	c	*	e	f	g	h	i	j	#	l	m	n			a	b	c	f	g	e	*	h	i	j	n	l	m	#										
MC774	MC874	MC974																																a	b	c	*	e	f	g	#		
MC775	MC875	MC975		a	b	c	*	e	f	g	h	i	j	#	l	m	n			l	n	a	n	b	c	*	g	h	e	f	j	i	#										
MC777	MC877	–		–	–	c	*	e	f	g	h	i	j	#	l	m	n																											
MC779	MC879	–		a	b	c	*	e	f	g	h	i	j	#	l	m	n																											
MC780	MC880	–		–	–	c	*	e	f	g	h	i	j	#	l	m	n																											
MC783	MC883	MC983		a	b	c	*	e	f	g	h	i	j	#	l	m	n			n	m	l	c	b	a	*	e	f	g	j	i	h	#										
MC784	MC884	MC984		a	b	c	*	e	f	g	h	–	j	#	l	–	n			l	–	n	a	b	c	*	e	f	g	j	–	h	#										
MC785,A	MC885,A	MC985		a	b	c	*	e	f	g	h	i	j	#	l	m	n			a	b	c	f	g	e	*	h	i	j	n	l	m	#										
MC786	MC886	MC986		–	b	c	*	e	f	g	–	i	j	#	l	m	n			l	b	c	–	m	n	*	e	f	g	–	i	j	#										
MC787	MC887	–		a	b	c	*	e	f	g	h	i	j	#	l	m	n																											
MC788	MC888	MC988		a	b	c	*	e	f	g	h	i	j	#	l	m	n			l	m	n	a	b	c	*	e	f	g	h	i	j	#										
MC789,A	MC889,A	MC989		a	b	c	*	e	f	g	h	i	j	#	l	m	n			h	i	j	e	f	g	*	a	b	c	l	m	n	#										
			Pin No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	1	2	3	4	5	6	7	8	9	10	11	12	13	14	1	2	3	4	5	6	7	8	9	10
MC790	MC890	MC990		a	b	c	*	e	f	g	h	i	j	#	l	m	n			l	m	n	a	b	c	*	e	f	g	h	i	j	#										
MC791	MC891	MC991		a	b	c	*	e	f	g	h	i	j	#	l	m	n			l	m	n	a	b	c	*	e	f	g	h	i	j	#										
MC792	MC892	MC992		a	b	c	*	e	f	g	h	i	j	#	l	m	n			l	m	a	b	n	c	*	e	f	g	h	i	j	#										
MC794	MC894	–		a	b	c	*	e	f	g	h	i	j	#	l	m	n																											
MC796	MC896	MC996		–	b	c	*	e	f	–	h	i	j	#	l	m	n			j	i	h	–	f	c	*	e	b	–	n	m	l	#										
MC797	MC897	MC997		–	b	c	*	e	f	–	h	i	j	#	l	m	n			l	m	n	–	b	c	*	e	f	–	h	i	j	#										
MC799	MC899	MC999		–	b	c	*	e	f	–	–	i	j	#	l	m	–			i	f	j	e	*	c	m	l	b	#					i	f	j	e	*	c	m	l	b	#
MC9701	MC9801	–		a	b	c	*	e	f	g	h	i	j	k	l	#	n	p	q																								
MC9702	MC9802	–		a	b	c	*	e	f	g	h	i	j	#	l	m	n																											
MC9704	MC9804	–		a	b	c	*	e	f	g	h	i	j	k	l	#	n	p	q																								
MC9707	MC9807	–		a	b	c	*	e	f	g	h	i	j	k	l	#	n	p	q																								
MC9709	MC9809	–		a	b	c	*	e	f	g	h	i	j	#	l	m	n																											
MC9713	MC9813	–		a	b	c	*	e	f	g	h	i	j	#	l	m	n																											
MC9714	MC9814	–		a	b	c	*	e	f	g	h	i	j	#	l	m	n																											
MC9715	MC9815	–		a	b	c	*	e	f	g	h	i	j	#	l	m	n																											
MC9719,A	MC9819,A	–		a	b	c	*	e	f	g	h	i	j	#	l	m	n																											

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